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Report of the School Building Committee

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PREFACE.

At their meeting held at Hyderabad-Deccan on the 14th and 15th January 1942, the Central Advisory Board of Education considered, *inter alia*, the report of the Committee appointed by them at their meeting in January 1941, to examine what steps could be taken in the interests of efficiency and economy to improve the planning, construction and equipment of school buildings. The Board adopted the recommendations of the Committee and further decided that—

(i) The Educational Commissioner should be authorised to reproduce in book form the material contained in the report together with such further information including illustrations, plans, costings, and estimates as he may consider necessary.

(ii) The Educational Commissioner should be asked to prepare a detailed note on the question of financing substantial schemes of non-recurring educational expenditure out of loans, a general principle which has the Board's strong support.

(iii) The Educational Commissioner should be authorised to appoint an expert Committee to prescribe adequate standards for Indian schools in respect of lighting, heating and ventilation

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सत्यमेव जयते

Report of the School Buildings Committee of the Central Advisory Board of Education, 1941.

At their sixth meeting held in January 1941 the Central Advisory Board of Education had under consideration the desirability of setting up an expert committee to examine what steps could be taken in the interests of efficiency and economy to improve the planning, construction and equipment of school buildings.

The Board were in agreement as to the importance of taking steps to ensure that school buildings should be designed in future with closer attention to modern scientific standards in regard to accommodation, lighting, ventilation and sanitation and with due regard to economy. The Board recognised that a certain amount of experimental work had already been done in this sphere in different parts of India but decided that in order to collate the results of these experiments as well as to consider problems which have not yet been tackled, it would be desirable to appoint a special Committee to prepare a report for the guidance of all authorities concerned with the provision of school buildings. The Board accordingly set up a Committee consisting of the Provincial Directors of Public Instruction or their nominees, and representatives of some of the larger States in India, with the Educational Commissioner with the Government of India as its Chairman. This Committee was given power to co-opt and/or consult such experts as they might think desirable. The Committee as finally constituted met at New Delhi on the 30th and 31st October and 1st November 1941. The following members were present:—

John Sargent, Esq., M.A., C.I.E., Educational Commissioner with the Government of India. (*Chairman.*)

W. H. F. Armstrong, Esq., M.A., I.E.S., Director of Public Instruction, Punjab.

S. M. Azam, Esq., Offg. Director of Public Instruction, Hyderabad-Deccan.

J. M. Bottomley, Esq., C.I.E., I.E.S., Director of Public Instruction, Bengal.

A. W. H. Dean, Esq., C.I.E., M.C., Superintending Engineer, Delhi Province.

A. Gopala Menon, Esq., M.A., B.Com. (Lond.), Director of Public Instruction, Travancore.

Dr. G. G. R. Hunter, M.A., D.Phil. (Oxon.), F.R.A.I., I.E.S., Director of Public Instruction, Central Provinces and Berar.

Dr. Jyotindra Markand Mehta, M.A. (Oxon.), Ph.D. (Lond.), Bar.-at-Law, Commissioner of Education, Baroda.

J. Leitch Wilson, Esq., M.A., Superintendent of Education in Baluchistan.

E. G. McAlpine, Esq., M.A., Director of Public Instruction, Mysore.

M. A. Mirza, Esq., C.E. (Lond.), Chief Engineer and Secretary to H. E. H. the Nizam's Government in the Public Works Department, Hyderabad.

सत्यमेव जयते

S. N. Moos, Esq., I.E.S., Director of Public Instruction, Bombay.

J. C. Powell-Price, Esq., C.I.E., I.E.S., Director of Public Instruction, United Provinces.

D. S. Reddy, Esq., M.A., (Oxon.), M.B.E., Deputy Director of Public Instruction, Madras.

S. C. Roy, Esq., I.E.S., Director of Public Instruction, Assam.

K. G. Saiyidain. Esq., B.A., M.Ed., Director of Education, Kashmere.

Surendra Nath Kar, Esq., Architect, Visva-bharati, Santiniketan, Bengal.

W. W. Wood, Esq., F.R.I.B.A., M.I.Struc.E., Principal, Delhi Polytechnic, Delhi.

Mr. A. S. Khan, I.E.S., Director of Public Instruction, Bihar, Khan Sahib Khan Shah Alam Khan, M.A., LL.B., Director of Public Instruction, North-West Frontier Province, Shamsul-Ulema Dr. U. M. Daudpota, M.A., Ph.D., Director of Public Instruction, Sind and Mr. S. C. Tripathi, I.E.S., Director of Public Instruction, Orissa, were unable to attend. The agenda and other papers circulated with it to the Members of the Committee will be found in Annexures I, II and III. In addition a Note on primary school buildings in rural areas by Dr. G. G. R. Hunter was circulated previous to the meeting (Annexure IV).

In opening the proceedings the Chairman welcomed the Members of the Committee and explained briefly the reasons which had led to its being set up. He stated that during the last ten years, a considerable amount of research work had been done in the western countries and in particular by the National Institute of Industrial Psychology, Great Britain in co-operation with Education Authorities with the object of determining the environmental conditions under which both teachers and children would be capable of the maximum out-put without undue fatigue. They had been led to undertake this enquiry in view of the surprisingly successful results which had attended a similar investigation into factory conditions. The outcome of the enquiry had more than justified the labour and expense involved and had shown that there were scientific principles which if applied to the design and planning of schools would greatly improve their efficiency without necessarily increasing their cost. It had been conclusively shown that it was possible to prescribe and secure standards particularly in regard to lighting, heating and ventilation which eliminated unnecessary strain and fatigue and thereby increased output. The fact had of course to be recognised that a large number of schools in this country were housed in buildings that were never intended to be used as schools and that even in the case of new schools, financial considerations tended everywhere to determine construction. At the same time he felt that in India, where climatic conditions might simplify the building problem in some places and complicate it in others, any practical contribution towards the solution of the issue submitted to the Committee would be of immediate value to every authority responsible for the erection or provision of schools. In his opinion the function of the Committee was not to attempt to prescribe building standards for universal adoption but having due regard to essential educational requirements, climatic considerations and the need for economy to indicate possible alternatives in the way of school planning and construction for the guidance of all authorities concerned with these matters.

Scope of the Enquiry.—Although the terms of reference do not delimit in any way the extent of the enquiry, the Committee first considered whether it would be desirable and practicable to extend the investigation to cover educational institutions beyond the high school stage. It was felt that as the planning of technical and art institutions, university colleges and universities, and even training colleges and normal schools, would be largely determined by the particular nature of the work which they would be called upon to undertake and as this would vary from institution to institution to a greater or less dergee, the prescribing of any schedule of accommodation, arrangement of buildings, etc., that would be generally applicable, would be an impossible task. It was, however, agreed that it might be feasible to lay down certain principles which might be observed in the design and planning of the buildings for such institutions. (*cf.* Section 13).

2. *Class room area per pupil.*—The Committee felt that as the principal unit in the types of school under consideration is and is likely to remain the ordinary class room, they should start by determining the superficial and cubic area which each pupil should be allotted in a room of this kind in order to secure for him or her reasonable space for movement and an adequate supply of fresh air. The standard prescribed by the Board of Education, England, is 10 sq. ft. for every pupil under 11 years of age and 12 sq. ft. for those over 11, with a minimum height of 11 ft., if the room has a flat ceiling. It was recognised that in England class rooms at all stages of education would be provided with desks or with chairs and tables and that the presence of furniture involved a greater demand on floor space than the habit of sitting on the floor, which is prevalent throughout primary schools in India. On the other hand climatic conditions in many parts of India increase the importance as well as the difficulty of securing an adequate air supply for every pupil.

The Committee came to the conclusion that 10 sq. ft. should be recommended as the minimum floor area per pupil in Primary Schools and 12 sq., ft. in Middle and High Schools. The minimum height of class rooms should be 12 ft. but this should be interpreted as the average mean height where the roofs are not flat. It was agreed that this height might be reduced by 1 foot or possibly more when one or more sides of the class room are entirely open to the air. The height should in no case be reduced below the level necessary to secure both sufficient natural lighting and efficient heating (or cooling as the case may be).

The same floor and air space would be required for girls as for boys.

3. *Minimum sizes of rooms.*—(a) Ordinary class rooms.—Having set out what they regard as the minimum superficial and cubic space which is required for each pupil, the Committee with the object of deciding the size of an ordinary class room proceeded to consider the maximum number of pupils which it should be designed to accommodate. This they agreed should be fixed at 40 in Primary Schools and at 35 in Middle and High Schools, the standard to be the same both for boys and girls and for schools in urban and in rural areas. It would, however, obviously promote economic construction and facilitate the transfer of schools from one grade to another as required, if the class rooms in all types of schools in the same area could be of a uniform size. The adoption of what is known

as the 'convertible unit' has proved of the utmost utility in schemes for educational reorganisation in Great Britain where a school planned for junior children might subsequently be required for seniors and *vice versa*. On the basis of 10 sq. ft. each for 40 pupils in a Primary School and 12 sq. ft. each for 35 in a Middle and High School as suggested in the previous chapter the minimum floor area for a class room would vary between 400—420 sq. ft. in the type of school now under consideration. The Committee therefore came to the conclusion that a minimum floor area of 400 sq. ft. or a little over might safely be prescribed for the ordinary class room in any type of school, though where funds permit this might be extended up to 480 sq. ft. with advantage from the purely educational standpoint.

(b) *Special rooms.*—The Committee next considered the floor areas which should be provided for laboratories and practical rooms, *i.e.*, rooms for the teaching of various arts and crafts, in schools of different types. So far as Primary Schools are concerned, it was felt unnecessary to have any special provision for science teaching and for practical work since in neither case at this stage would the use of any but the simplest apparatus or equipment be involved and an ordinary class room of the size already prescribed should be large enough to satisfy normal requirements. In those schools, however, which provide specially for infants and nursery classes there should be rooms of 600 sq. ft. for these, since very small children need approximately 50 per cent more floor space for the free movement which is now accepted as an essential feature of kindergarten training. In Middle Schools which do not form part of High Schools and will in most cases serve rural areas, it is unlikely that science will be taught on lines which will involve much practical work requiring the use by students of anything beyond very simple apparatus. In most schools also it will be found necessary to divide classes for science so that the average size will not exceed 20. It was therefore felt that a room of the ordinary class room size, *i.e.*, a 400 sq. ft. unit, would suffice. Where, however, it was found necessary or desirable that a whole class (*i.e.*, max. of 35-40) should take science together, it was suggested that two 400 sq. ft. class room units with a removable partition could be combined when required into a science laboratory of 800 sq. ft.

In High Schools it was agreed that both for science laboratories and for arts and crafts a room equivalent in area to two class room units, *viz.*, 800 sq. ft. would be needed for a half class.

4. *Minimum accommodation required in schools of various types.*—Having thus defined the floor area of the main types of room required in a school building by multiplying the number of pupils in a given class by the number of sq. ft. which each of them needs for reasonably comfortable and hygienic working, the Committee next considered what should be the minimum accommodation (including rooms both for the teaching and non-teaching purposes) which ought to be provided for schools of different sizes at each of the three main stages of education with which they are concerned, *viz.*, Primary Schools, Middle Schools (which do not form part of High Schools), High Schools (including middle sections). The Committee wish to make it clear that in drawing up a schedule of accommodation they have no intention of trying to lay down hard and fast rules. Their main object is to indicate in a fairly precise way the minimum accommodation which in their opinion will allow schools of varying sizes at the three different stages specified to work efficiently.

In the interests of economy which is a consideration of paramount importance in most parts of India so far as school building is concerned, they have not suggested the provision of any rooms which, however, desirable, cannot be regarded as essential. For instance there can be little question that a separate hall is extremely desirable for corporate activities in a large Primary or Middle School; similarly in a large High School a separate Hall and gymnasium and, when any considerable number of pupils take meals at school, a separate dining room will not only add enormously to the amenities of the school but will also greatly facilitate the task of organisation. Extra accommodation of this kind should certainly be provided when funds allow.

The schedules of accommodation set out below have been drawn up with due regard to the activities covered by the normal curriculum in schools of the type specified. The Committee recognise that whenever the curriculum departs from the normal, *e.g.*, in giving a much greater amount of time to handicrafts, more practical rooms and possibly less ordinary class rooms will be required. It is also not the intention of the Committee to suggest that the sizes of school chosen by them for the purpose of illustration are either those that commonly exist or those that should be adopted for ideal organisation. The reasons which led to their selection will no doubt be sufficiently apparent. At the same time it is desirable to point out that in cases where the size of school need not be finally determined by the number of pupils available, there is an optimum size at each stage of education which enables the most economic use to be made of the accommodation and staff, and in particular of the special rooms and specialist teachers. For example, if there are 30 teaching periods in a school week and the average number of periods per week which each class or half-class devotes to a practical subject such as wood and metal work or spinning and weaving or domestic science is three, then a school with ten classes or half-classes will enable the special room and teacher provided for each of these subjects to be fully employed. If there are fewer classes than ten, then expensive accommodation and equipment and a specialist teacher will be standing idle part of the time while if there are more, additional special rooms and teachers will be required and these again will not be fully employed until the number of classes doubles the original figure. Classes however cannot be multiplied indefinitely for there is a fundamental educational consideration which ought always to limit size. When any school gets beyond a certain number—experience suggests about 500 pupils—it begins to lose certain characteristics which are esential to the conception of a good school, *e.g.*, the Head is no longer able to maintain contact with individual pupils and parents and the pupils themselves cease to be conscious of being members of a living corporate entity.

On the other hand a warning must be uttered against any assumption that the organization of the school can or ought to be unduly simplified purely in the interest of economising space. Apart from the splitting of classes for science and practical subjects which is usual throughout the world, most schools in India are faced with a further cross-classification to provide for language teaching. The provision of a reasonable margin of accommodation particularly at the higher stages is consequently inevitable. The Committee have met this need by recommending the provision of a class room for each class or class section in addition to laboratories and practical rooms. When the latter are used to anything like their full capacity, it must follow that there will always be some class rooms available for language groups.

Before drawing up a schedule the Committee examined the needs of schools of the three new types for teaching and non-teaching accommodation.

(a) *Primary Schools.*—There are certain needs common to all Primary Schools. The Committee are strongly of opinion that to secure the conditions necessary for effective teaching each teacher whether in charge of one or more classes or class sections should have a class room to himself.

The Committee also recognise the educational advantage of every school having some place where all the pupils can be assembled from time to time for school functions, religious exercises and other forms of corporate activity, and which in variable climates can be used for physical training, music, rhythmical exercises, dramatics, etc., which require more space than that afforded by the ordinary class-room. For reasons given earlier in this report they are unable to regard the provision of separate halls as an essential part of the accommodation of a Primary School. At the same time they think that other less expensive means might be found of providing the space required. The most obvious of these is to arrange that the partitions between class rooms should be capable of being removed and replaced so that two or more class rooms can be thrown together when a larger room is required. The Committee do not favour the movable partition commonly used in schools in Europe partly owing to its cost and partly because it would be unlikely to stand up to Indian climatic conditions. It was however suggested that partitions might be made of bamboo or other light screens which could be easily lifted out and put back, though doubts were expressed as to whether partitions of this nature would be effective in excluding sound and possible disturbance from the adjoining class room. The most promising alternative appeared to lie in an extended use of verandahs. Various designs (which will be incorporated in the proposed book of school plans) were suggested for enlarging verandahs so that they might provide some at any rate of the facilities normally afforded by a school hall. Apart from their use in this particular capacity the Committee wished to emphasise the importance of verandahs in all types of school buildings and particularly in those for schools in rural areas. In many districts a verandah will be an essential protection against excessive heat or heavy rain. It can also be used for open air classes in suitable weather. To be of the greatest use in these connections it should not be less than 8 ft. in depth. Its position in the plan will naturally be determined by the orientation of the main building which should itself be influenced so far as possible by the climatic conditions prevailing in the area.

In addition to the rooms required for actual teaching purposes the Committee regard adequate storage accommodation as essential in even the smallest school, particularly in view of the increased amount of practical work which is now being introduced into the curriculum, and the desirability of preserving specimens of the hand work done by the children. The accumulation of litter in the class room must on all accounts be avoided and the sort of almirah usually provided tends to occupy far too much space. A separate store-room, the size of which will obviously vary with the size of the school, should therefore be provided wherever possible

The Committee do not regard the built-in cupboard, common in modern school buildings in western countries as a practicable alternative owing both to Indian climatic conditions and to the nature of the construction of most primary schools but they feel that where the type of construction allows, the possibility of providing recesses in the walls of class rooms in which almirahs can be placed so as to avoid encroaching on floor space should be explored.

The Committee also attach importance particularly in the larger primary schools to some place being provided where the staff can do such administrative work as falls to their lot, interview parents and enjoy reasonable privacy in the intervals between lessons. Improvements in primary education are bound up to no small extent with raising the status of the teacher in the eyes of the public and it is felt that the provision of reasonable amenities for teachers in the school premises will help towards this end.

In the light of the foregoing general considerations it is possible to suggest the minimum accommodation which should be provided for Primary Schools of different sizes. As has been already stated the sizes taken by the Committee are not to be regarded as ideal units. In any case the predominant factor in settling the size of a school must be the number of children available. Nevertheless it is hoped that the units selected will illustrate satisfactorily what the Committee have in mind and that there will be little difficulty in adding to or subtracting from the schedule of accommodation suggested to meet the needs of schools of different sizes. Sanitary arrangements will be dealt with separately under Sanitation (pp. 138-141) and the question of the area needed for playing space and physical training under Sites (pp. 147-148).

While the Committee hope that in the interest of efficiency the single teacher school with its obvious drawbacks will be progressively eliminated, they are bound to accept the fact that a very large proportion of primary schools partial in rural areas will remain of the two teacher type. In view of their large number and the very limited resources of the authorities usually responsible for creating and maintaining them, the Committee felt the paramount need of restricting the schedule to the very minimum i.e., 2 class rooms of the minimum size already prescribed viz. 400 sq. ft. with a verandah wherever possible and a small room for storage. Where the store room is large enough a portion of it should be partitioned off for the use of the teachers. The next size taken is the 5-teacher school which provides a separate class section for each of the five years normally covered by the Primary course. In addition to the five class room units it is suggested that an extra unit (400 sq. ft.) should be provided to be subdivided into a teachers' room and a store room. In larger primary schools importance is attached to the provision in addition to ordinary class rooms and rooms for teachers and storage of an additional unit to be used as a reading room and library.

No special rooms are suggested for science and handicrafts in Primary Schools as at this stage these subjects, where they are taken, can be catered for in an ordinary class room. For the reasons given earlier the Committee are unable to recommend the provision of separate Assembly Halls for Primary Schools.

(b) *Middle Schools not forming part of High Schools.*

(*N.B.*—Where Middle Schools contain Primary departments the accommodation for the latter should be determined in accordance with the schedule prescribed for Primary Schools).

The middle stage normally covers 3 years and the Committee have assumed that self-contained middle schools will contain 3 classes or some multiple of 3 classes. Each class or class section will require a class room of the standard size. In a 3-class school one additional standard unit (400 sq. ft. approx.) should suffice for science and another for art and handicraft. Bigger schools may require 2 additional units for one or both of these subjects but this will be determined by the number or size of classes and the amount of time allotted to these subjects in the time table.

The reasons which have deterred the Committee from prescribing separate Assembly Halls in Primary Schools apply also in the case of Middle Schools. In all these schools however, there should be an additional unit or its equivalent in floor space for office and library and another for teachers and storage. Very large schools will require a separate unit for the library and two more for the other purposes specified.

(c) *High Schools (with Middle Sections).*

(*N. B.*—When High Schools contain Primary as well as Middle sections the accommodation for the Primary department should be determined in accordance with the schedule prescribed for Primary Schools).

In most parts of India the High (including Middle) School course covers 5 years. It will therefore normally contain 5 classes or some multiple of 5 classes, though for reasons already given the Committee would regard a school with 20 classes as the largest which under any circumstances could be accepted as an efficient unit for educational purposes.

The five-class High School in addition to 5 class rooms of the standard sizes (400 sq. ft. unit) should also contain a Science Laboratory (2 units), an Art and Craft Room (2 units), a Practical room for handicrafts, including Domestic Science in the case of girls, (2 units) a Library and Reading Room (1 unit). The Committee were strongly of the opinion that in view of the increasing importance attached to these subjects at this stage there should be special rooms of a larger size, *e.g.*, 600 sq. ft., for History and Geography. These may be provided in place of 2 ordinary class room units but it was felt that where the need exists to make special provision for language teaching, the History and Geography rooms should be in addition to the normal class room accommodation. Apart from the rooms required for teaching purposes there should be a Headmaster's (or Headmistress') room and office (1 unit), Staff room (1 unit), and a store room (½ unit). Extra-curricular activities should receive special encouragement at the High School stage and the Committee are of opinion that every High School should have accommodation for these including a room for Boy Scouts or Girl Guides (½ unit). There should also be a retiring room for girls, the size depending on the number of girls on the register. In the case of schools containing more than 5 classes the teaching accommodation should be increased proportionately though the additions required to the laboratories and practical rooms will obviously be determined in the light of the time devoted to the subjects concerned. There is a small but increasing number of High Schools which include classes XI and XII. In such cases an additional small laboratory (1 unit) would be necessary over and above extra class-room provision, where Science is taken.

The Committee regard the provision of an Assembly Hall and/or Gymnasium as extremely desirable in every large High School. The very high cost of such provision is the sole reason which has led them to exclude it from the minimum schedule of accommodation.

5. *Dimensions of Rooms.*—Apart from the question of the floor area, the actual dimensions of rooms used for teaching purposes deserve consideration.

Experience suggests that for convenient class arrangement and blackboard visibility a slightly rectangular room is better than a square one. The standard class room unit of approximately 400 sq. ft. should preferably be 22' × 18' rather than 20' × 20'. Moreover when it may be necessary to combine two units to form a laboratory or practical room an area 22' × 36' has obvious advantages over one 20' × 40'. The importance of having minimum dimensions for class rooms and particularly for laboratories and practical rooms has been stressed in recent pamphlets on school buildings issued by the Board of Education (England). The Committee, however, do not overlook the fact that adherence to a uniform square unit may simplify the question of planning and reduce the cost of construction. In a subsequent section of this report (*cf.* Section 12) they make suggestions which will allow laboratories and practical rooms to be of the requisite shape without affecting the economic planning of the main building. Special consideration, however, is required in the case of Assembly Halls and/or Gymnasia, where provided. The minimum dimensions of a Gymnasium or any room which it is intended to use for physical training should be 60' × 30'. Assembly Halls should provide at least 4 sq. ft. per pupil or person to be accommodated and the proportion of length (including stage) to breadth should not be less than 5 : 3. A gallery is a cheap and effective method of adding to the holding capacity: it can also be designed to improve acoustics.

The Committee gave special consideration to the provision which should be made for those pupils who take meals at school. The requirements of hostels are dealt with separately. (*cf.* Section 10). The Committee strongly deprecate the provision of separate dining rooms for different castes. It is essential to the conception of a school that pupils should take their food together, subject of course to both vegetarian and non-vegetarian food being provided where desired. The Committee recognise, however, that economic and other considerations must largely determine the nature of the arrangements made for school meals.

They contemplate that in some areas and particularly in schools attended by the children of the well-to-do it may be feasible to provide separate dining rooms in which pupils will take their meals seated at tables in western fashion. Another alternative is the standing buffet or milk bar where pupils will be able to obtain meals or supplement food brought from home. Thirdly, there is the provision of a simple weather-proof shed with a clean floor where food may be taken in Indian fashion. In all cases, the Committee feel that the arrangements made should be as simple and inexpensive as is consistent with cleanliness and decency but they emphasise the fact that the value of the school meal as a means of inculcating hygienic habits and good manners can hardly be exaggerated. Where separate accommodation is provided for dining the size of the room must be determined in the light of the number of pupils likely to take meals at school. Care should be taken to see that kitchens, pantries, etc., while conveniently situated in relation to the dining room, are not so placed that the smell of cooking will permeate the class or other teaching rooms.

6. *Special requirements of Technical High Schools and Junior Technical Schools not accommodated in Senior Technical Institutions.*—Pupils in schools of this type at any rate during the later years of the course will devote a much greater proportion of their time to practical work than those in the normal high schools. Increased provision of workshop and drawing office accommodation will thus be required. Since provision of this kind will probably be available during the day time at any Technical College or Institute, the advantage of housing Technical High Schools and Junior Technical Schools in senior Technical Institutions, wherever possible, needs no emphasis.

Where however senior technical institutions are not available for this purpose special additional accommodation over and above that recommended for the ordinary High School will be required. A Technical High School containing 360—400 pupils should have 2 additional workshops and a drawing office. Each of these should have floor space equivalent to that of 2 standard units *viz.* 2 x 400 sq. ft. = 800 sq. ft. and should be provided in addition with adequate storage and a small room for the instructor in charge. In view of the large amount of time which Technical High School pupils spend in laboratories and workshops, it may be practicable, even though it complicates organisation, to make some reduction in the number of ordinary class rooms provided. In no case, however, can a laboratory or craft room be treated as equivalent to more than half a class-room.

7. *Special accommodation needed in Schools for Physically or Mentall Defective Children.*—Consideration was next given to the question whether any special accommodation is needed in the case of schools for children suffering from physical or mental defects. So little attention has hitherto been paid in India to this particular problem, that the Committee were doubtful whether such practical experience as is available would be sufficient to enable them to make specific recommendations. They felt it desirable, however, to record the opinion that although the average number in a class in the special schools for these children would be considerably smaller as a rule than that in an ordinary school, this should not be regarded as an adequate reason for reducing the size of any class room below that of the standard unit prescribed for normal children *viz.* 400 sq. ft. Children with physical defects require more space for movement and often need special furniture, while in a mentally sub-normal class freedom of movement, variety of practical occupations and personal supervision by the teacher all demand ample floor space. It is likely much experiment will be necessary before the type of accommodation especially suited to Indian conditions can be discovered.

8. *Additional accommodation for schools likely to be used also for Adult Education.*—Considerations of economy alone make it inevitable that enterprises connected with Adult Education should have to share the buildings as well as the staffs belonging primarily to other branches of Education. This fact, however, should not prevent some provision for

adult classes being made in the planning of schools, particularly in rural areas. In all the larger schools of this type a separate full size room (*i.e.* one unit) should be provided for the use of adults. It is not considered necessary however to prescribe additional accommodation for adult classes in urban areas as it is felt that these would usually contain a High School or schools with a variety of suitable rooms or even a technical institute which could be placed at the disposal of adult classes out of normal school hours. The desirability of providing cultural and recreational facilities for adults in all technical institutions is being increasingly recognised.

As Adults have to be attracted to attend classes, it is important that the conditions under which such classes are held should be reasonably comfortable. The creation of a club rather than a school atmosphere is highly desirable and the furnishing of schools likely to be used for adult education should be considered from this point of view. A library and reading room is an essential requisite in every adult centre and wherever possible rooms suitable for music, dramatics, discussion groups etc. should be made available.

9. *Lighting, Heating, Ventilation and Sanitation.*—The need for scientific standards in the case of lighting, heating, ventilation and sanitation was discussed next. The Committee were agreed as to the extreme importance of securing adequate standards in these respects in all schools. It was felt that even where genuine efforts are made to provide good buildings, too little attention is paid to determining what in fact constitutes the conditions under which both teachers and taught are likely to give of their best. Climatic conditions in many parts of India put a premium on the need for making certain that such factors as eye-strain, uncomfortable temperatures and inadequate ventilation are not subjecting the inhabitants of a school to unnecessary fatigue. It has been ascertained by scientific research in recent years in western countries that there is a mean between too much and too little light, too much and too little heat, too much and too little draught, the attainment of which automatically reduces fatigue and increases output. It has also been found that these standards can be applied to school buildings without in any way increasing their cost. It is a question of design rather than of materials. The Committee feel that the ascertainment of such standards for Indian schools is a matter of urgent importance which should be investigated without delay by an expert committee.

The Committee lay equal stress on the desirability of adopting adequate standards in connection with sanitary accommodation. Much has to be done in the way of improving personal and social hygiene in the schools, but habits of cleanliness cannot be inculcated and maintained so long as the washing facilities and other necessary conveniences remain hopelessly inadequate. Although hygienic standards in this country generally are rising, it must be admitted that facilities for sanitary arrangements even in schools for the well-to-do usually fall far below any reasonable standard.

Where there is a water-carriage system available every school should be compelled to make use of it. There should be a generous supply of water, soap and clean towels to serve the needs of pupils after exercise or other practical activities and wherever possible showers and wash basins should be provided. The Board of Education, England, prescribes a minimum of 12 basins for the first hundred children and 4 for each additional hundred. With the growing attention now being given to games and physical exercises it is highly desirable to have a changing room of adequate dimensions for the numbers involved. In connection with this showerbaths on the basis of at least one per 25 pupils should be provided. Sprays and circular washing fountains are also recommended. In each washing room a small sink (about 14″ by 9″) for filling jugs and washing inkpots is desirable.

The Committee realise, however, that at the present time and for a long while to come the vast majority of schools will be situated in places not only where there is no water carriage system but also where the supply of water itself is strictly limited. Even so they attach so much importance to a proper supply of water for school purposes that they have no hesitation in prescribing that every school should be provided with a sufficiently deep and pucca well. An area, not less than six feet in the width around the mouth of the well should be paved and made impervious, and the pavement sloped outward, should be at such a height as to allow the waste water to be carried through an open drain as far as the school garden. A cistern should be placed on a high platform for storing sufficient quantity of water for various sanitary purposes. The mouth of the well should be protected with a parapet of a sufficient height to prevent any water splashing back into the well, should anyone be washing or bathing nearby, as is the traditional custom in Indian villages. In areas where the subsoil water level is fairly high, tube wells should be provided if arrangement can be made for their being kept in proper order and in others an open dug-out tank suitably protected may serve for washing purposes.

Apart from water for washing an adequate supply of drinking water is essential in all schools. The best way of providing this where water is laid on is by drinking fountains of the bubble or spray type. There should be one drinking fountain for every hundred pupils with a minimum of two. The provision of a sink with water taps at convenient heights for filling jugs, etc. is desirable. In the absence of a water carriage system, tanks with taps and securable lids, and with facilities for emptying and cleaning are recommended for drinking purposes. Jars with taps and a siphon system have also been found satisfactory.

In schools, where a water carriage system exists, the W. Cs. and urinals may be placed adjacent to or even in the main building. If these are kept scrupulously clean, as they always should be, and if the children are trained in their proper use from their earliest years, there is no reason why this proximity should have any unpleasant effects, while from the point of view of convenience and discipline it will have obvious advantages. Wherever possible latrine accommodation should be within easy reach of the playgrounds and playing fields. Where this is not possible, some separate accommodation will have to be arranged. W. Cs. and urinals should be well-lighted and ventilated and so constructed that their cleaning is an easy matter. The following may be regarded as the minimum requirements where a water-carriage system is available:—

*Girls 6 W. Cs. for first 100 and 2 for each additional 100.

*Boys 3 W. Cs. for the first 100 and 2 for each additional 100.

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*The Board of Education recommendations are :—

Girls : 6 W. Cs. for first 100 and 4 W. Cs. for each additional 100.

Boys : 4 W. Cs and 10 ft. run of urinals for first 100 and 3 W. Cs. and 10 ft. run of urinals for each additional 100.

Urinals where provided should be on the basis of 10 ft. run per 100 boys.

The size of the water closets should be about 2 ft. 6 inches by 4 ft. 6 inches. Doors should not be more than 6 ft. in overall height. In infants' W. Cs. the chains should be of a length which can conveniently be used by small children. The walls should be finished by some smooth, hard surface upon which writing is impossible.

Where a water-supply is not available, the Committee considered with the advice of experts the respective advantages of the following systems:—

1. Bore hole,
2. Septic tank,
3. Dry closet (as used in rural schools in England),
4. Service latrine.

The Committee have placed these in what they would regard as their order of utility for India generally; they do not favour the service latrine when it can be avoided. They realise, however, that local conditions and customs will largely determine the choice. The point to which they attach chief importance is that whichever type is chosen, it should be used and maintained in the best possible way. The Committee have been able to obtain from experts detailed descriptions of each of these systems and it is proposed that these should be included in the book which the Committee have in mind.

The Committee do not wish to conclude this section of their report without emphasising the extreme importance which ought everywhere to be attached to the maintenance of the highest possible hygienic standards in every type of school. The dangers likely to arise from inadequate drainage, the presence of avoidable litter and the insanitary practice of spitting are no doubt becoming better known but they are still far too often ignored in practice. Apart from the effect of clean and attractive surroundings on their physical well-being pupils will be found to react favourably in many other ways to a pleasant environment. Hygienic buildings have been proved by experience to be a strong inducement to the cultivation of hygienic habits by those who occupy them.

The Committee are aware that a very large proportion of the schools in this country are housed in rented buildings. While it may not be reasonable to require that all such buildings now in use should conform to the standards recommended in this report, the use of those which fall seriously short of them should be discontinued in the interest of the pupils' health at the earliest opportunity. Where it is necessary in future to have recourse to hired buildings, they should in all cases be inspected by a responsible officer of the Education Department in conjunction with an officer of the Public Health Department. Recognition should not be granted unless in respect of floor space, lighting, ventilation and sanitation they approximate closely to the requirements set out in this report.

10. *Hostels*.—In considering the nature and amount of the accommodation required for hostels, the Committee have taken as a convenient unit a hostel for 24 boarders, but the general requirements specified may be taken to apply with the necessary adjustments to smaller or larger units.

Sleeping arrangements may consist of open dormitories or partitioned cubicles or separate single rooms, but in the Committee's opinion, at any rate for boys and for girls up to the age of 16 or 17, an open dormitory is much to be preferred. It is more easily cleaned and aired, it is less dangerous in case of fire and it lends itself better to efficient supervision. A dormitory with 12 beds is a very desirable size. In girls schools separate dormitories should be provided for all girls above 12.

A floor area of not less than 50 to 55 sq. ft. should be provided for each occupant and the distance between beds should not be less than 3 ft. Where a dormitory is divided into cubicles each cubicle should have its own window. If dormitories or cubicles are not furnished with cupboards, a separate room or rooms should be provided for keeping clothes. In addition to dormitories a hostel should contain adequate living accommodation for use during out-of-school hours—*i.e.*, for study and recreation. A space of 20 sq. ft. per pupil is desirable in this respect. Proper quarters should also be provided for the person or persons in charge of the hostel and in High School hostels bed sitting rooms 10′ × 8′ should be given to prefects. A separate room should also be provided for meals but as stated elsewhere the provision of separate rooms for different castes or communities should be strongly discouraged. The kitchen, which should be as close as possible to the dining room, should be spacious and airy. While the actual cooking arrangements will naturally conform to local custom, ample storage space is essential. Modern labour saving appliances should be installed wherever practicable.

Arrangements for washing and bathing may be provided within easy reach from the dormitories. At least one shower is needed for every 10 boarders and one closet for every 5. For boys, urinals may be in the same scale as in the day-schools. Separate sanitary arrangements should be made for staff and for servants.

In every hostel there should be one or two rooms according to the number of occupants which can be used in case of sickness and effectively isolated. In a two-storeyed building, a sick room is necessary on each floor. In large hostels, a separate building will be necessary for infectious diseases, which should be self-contained with its own kitchen, sanitary and other facilities. The Committee are of opinion that the following schedule would be adequate but in no way extravagant for a hostel to house 24 boarders:—

2 Dormitories, for 12 each (each 600—660 sq. ft.).
1 Common Room for recreation (480 sq. ft.)
1 Study Room (480 sq. ft.).
1 Supervisor's (Bed-sitting) room.
1 Dining room.
1 Kitchen.
1 Store room.
1 Box room (small).
1 Fuel room.
1 Sick Room.

(1 water room where there is no water carriage system).

Baths and closets as prescribed.

Servants quarters.

Varandahs in hostels will serve the same useful purposes as in schools.

11. *Furniture and Equipment.*—In considering what furniture and equipment should be recommended for ordinary class rooms in Primary and Middle schools the Committee found themselves confronted by a more than usually sharp conflict between what is desirable educationally and what is practicable economically. In India at the present time the usual practice is for children in Primary schools to sit on the floor and for those in High schools to sit at desks or chairs and tables. In Western countries much importance is attached for health reasons to younger children in particular adopting a correct posture when at work and above all the proper support being provided for their backs during the period when the major bones are in process of hardening. Special care is taken to see that school desks and chairs are scientifically designed with this object in view.

In theory, therefore, at any rate the present Indian practice ought to be reversed. It was, however, suggested that sitting on the floor, provided that the floor is clean and dry, would not be detrimental to health if some simple means of affording back support could be devised. Before deciding to make any recommendations which would entail heavy expense on the authorities responsible for equipping Primary schools the Committee felt they should seek expert advice, on the medical issue involved. They accordingly referred the question of the desirability of providing furniture at the Middle and Primary stages to the Committee set up by the Chairman of the Central Advisory Boards of Education and Health in 1941, to consider what steps should be taken to improve the physical condition of school children. As will be seen from their report (Appendix IV) that Committee attach great importance to the effect of posture on a child's health and growth but consider that the matter requires special investigation by a body of experts. Without such an investigation it is not possible in their opinion to assess the ill-effects, if any, which the habit of squatting on the floor is having on the health of primary school children. Where, however, chairs or desks are supplied care should be taken to see that they are designed to give support in the right place. The Committee are of opinion that this is a matter which requires further investigation as suggested above.

Apart from this particular issue the problem of furnishing and equipping a primary school is a comparatively simple one. For obvious reasons such furniture as may be provided should be cheap and strong and since in the primary schools the ordinary class room will have to be used for a diversity of purposes, any furniture it contains should be light and easily movable. This is specially important in special rooms for infant or nursery classes. Reference has already been made to the need for storage and for almirahs, where so used, to be disposed in a way that will occupy as little floor space as possible.

In Middle schools seating accommodation may or may not be provided, in High schools it probably will be. Since a child who is comfortable is more likely to pay attention and concentrate on his work than one who is not, it is important here also that the seat should be made to fit the child rather than the opposite. Small tables and chairs in place of desks will make an ordinary class room much more adaptable for certain types of practical work, *e.g.*, needle work, book crafts etc. for which special rooms are not usually provided. Specially designed tables can be placed and where necessary clamped together to form work tables of a convenient size. Every class room in every school should be provided with a strip of 3-ply or other suitable wood 18" deep or with 3 pinrails 9" apart to which cuttings, charts and specimens of children's work can be easily affixed. The height of these should be roughly the child's eye-level.

The furniture and equipment for the various laboratories and practical rooms which the Committee have recommended in the case of Middle and High schools need careful consideration in the light of modern ideas with regard to science and handicraft teaching. The conventional type of laboratory equipment for instance is unnecessarily elaborate and expensive for all but the highest classes. A number of detailed suggestions for the furnishing of laboratories and of art and craft rooms which were discussed at the meeting of Committee will be found in Annexure V.

The question of furnishing Halls, gymnasia, libraries, dining rooms and hostels is dealt with in Annexure VI.

12. *Arrangement of School buildings.*—Apart from the actual accommodation to be provided, the planning of a good school building demands that very careful attention should be paid to the way in which the various rooms are arranged in relation to one another. The Committee agree that in a matter of this kind finality is neither attainable nor desirable. Theory and practice in education are constantly changing and it is to be hoped that they will continue to do so. The ideal school building, therefore, will be one that can be readily adapted to new ideas, not one which will put obstacles in the way of their adoption. No school should be built with the object of lasting for generations. The plan must be flexible and the construction as simple and elastic as may be compatible with other essential requirements. As a general rule it may be laid down, that those parts of the buildings least likely to change materially *e.g.* Hall, class rooms, teachers' and store rooms should be grouped together, while laboratories and practical rooms should be arranged in blocks separate from but reasonably close to the main building. For the same reason the former may if desired be built in more permanent construction than the latter. This will also facilitate laboratories and practical rooms being of such dimensions as may be educationally desirable without unduly complicating the design or increasing the cost of the main building. A further advantage of such an arrangement is that rooms which tend to be noisy, *e.g.* craft rooms, can be isolated from the others.

Certain other general considerations that should determine the planning of schools of all types are set out below:—

(a) Due regard should be had to aesthetic standards, *e.g.* form, design and colour, in school building, in order that object lessons in good taste may be at all times before the eyes of the pupils.

(b) The question of easy movement, particularly in large schools on more than one storey, is important. Corridors should be wide enough and staircases should be so placed as to avoid congestion when classes change and above all in the event of fire.

(c) Similar considerations should apply to the siting of cloakrooms, changing rooms, bicycle sheds etc. where provided.

(d) Latrines, urinals and lavatories should from the point of convenience be as accessible as possible from all parts of the school, subject always to their being so placed as to create neither a nuisance nor an eyesore.

(e) The possibility of extension being required at some future date should always be borne in mind.

(f) Verandahs can be made a most useful adjunct to almost any school in India. The uses to which they can be put have been described on page 133.

(g) Kindergarten rooms and rooms for young children should always be on the ground floor.

(h) Where ample sites are available single storey buildings have certain advantages. They facilitate elastic grouping of rooms as well as the use of light forms of construction.

(i) The orientation of all class rooms and verandahs and of many practical rooms needs careful consideration. Local climatic conditions will largely determine this and sites should be chosen with this factor in mind.

(j) Provided that the arrangement is convenient and the design harmonious, the particular shape of the plan is of little importance. The quadrangular plan popular in Western countries twenty years ago has definite disadvantages, the most obvious being that it renders impossible the best orientation of many rooms. In rural areas there is much to be said both on grounds of economy and freedom from disturbance in favour of building class rooms as separate units appropriately disposed in the school compound, a method commonly adopted in the case of open-air schools for delicate children in Great Britain.

(k) Economy can be effected and planning facilitated by the adoption of a standard class room unit which can be multiplied if necessary where larger rooms are required. It would be an advantage if sound-proof adjustable partitions could be provided and where partition walls are provided they should be left free from carrying loads, so that they can be moved if, at some future date, it should be necessary to rearrange the rooms.

Some interesting modern suggestions with regard to the arrangement of school buildings for Primary schools are contained in the 'Design of Nursery and Elementary Schools' published by the Architectural Press, London, 1938. Extracts from this book will be found in Appendix IV.

18. *General principles applicable to the design and planning of educational buildings beyond the High School stage.*—Beyond the High School stage so many considerations affect the design and planning of educational buildings that as already stated the Committee feel no useful purpose would be served by their attempting to prescribing any principles of general applicability as regards schedules of accommodation, planing or types of construction. The Committee believe, however, that there are

certain criteria which should be observed in the building of Universities, Colleges and Technical Institutions as well as at the lower stages of education.

The first of these is that the whole conception of the buildings should be dignified and harmonious. Students at this stage are not less susceptible than their juniors to aesthetic influences. The educational value of a beautiful enviroment can hardly be exaggerated. A beautiful building, however, does not mean one elaborately designed or constructed of expensive material. A Technical Institute can be as satisfying aesthetically as any Arts College, so long as its design is primarily determined by fitness for its purpose. Ships, motorcars, aeroplanes and many other forms of essentially utilitarian construction illustrate this truth. The second criterion is the grouping within a harmonious whole of rooms according to function, *i.e.*, the special needs and uses of halls, libraries, gymnasia, class rooms, laboratories, practical rooms should always determine their disposition in the plan. Noisy rooms should be isolated. Rooms where for educational reasons exceptional dimensions are required should never be deprived of these simply in order that they may conform to architectural considerations.

Practical rooms and particularly those containing heavy machinery should be so planned that plant and materials can easily be delivered and removed. This applies particularly to technical colleges and institutes, where there should be easy access for lorries to all workshops.

14. *Alternative types of construction.*—The Committee were strongly of the opinion that the possibility of adopting various forms of temporary or semi-permanent construction as an alternative to *pucca* buildings should be exhaustively explored, not only in the interest of economy but also with a view to facilitating the adaptation of school buildings to changing educational ideas. There are all over India various types of indigenous construction which suit local climatic conditions. Many of these could be made suitable for school requirements. In a country like India, where there is so wide a difference in climatic conditions and materials available locally, it is not practicable to set up a common formula in regard to methods of construction. Subject to the general standards which they have prescribed being observed, the Committee feel that there is almost an unlimited field for experiment so far as the actual construction of schools and particularly of primary and middle schools in rural areas is concerned. Any of the following types again, subject to the consideration mentioned above, may be adopted to suit local requirements:—

(i) Buildings with frame work of bamboos, walling of split bamboos or reeds with or without mud plaster, roof covered with straw or grass thatch over bamboo framing, mud floor, doors and windows of bamboo. Wooden frame doors and windows may be introduced as an improvement on this type.

(ii) Buildings with mud walls replacing the bamboo frame or reed walling of the construction described above.

(iii) Buildings with mud walls and roof of burnt tiles or slates replacing straw or grass.

(iv) Buildings entirely of timber.

(v) Buildings of timber with roof of slates or corrugated sheets.

(vi) Buildings with mixed timber and mud walls or walls of sun-dried mud or bricks, and with burnt tiles, slates or corrugated roofing.

(vii) Buildings of unplastered brick, with thatched roofs or alternately slates or corrugated roofing, brick or concrete flooring and wooden doors and windows. Stone or concrete walls may take the place of brick walls where stone or concrete is cheaper or most easily obtainable than bricks.

The practice of roofing school buildings of this pattern in the tropical areas with corrugated iron sheets is not favoured. Other forms of corrugated sheeting are now coming on the market which are cheaper, lighter and more pleasant to the eye than corrugated iron. The Committee are strongly of opinion that provided the necessary standards in lighting, temperature and ventilation can be secured—and they see no reason why they should not be—the possibility of erecting satisfactory schools, particularly in rural areas, by adopting any or all of these forms of constructions should be carefully explored.

Experience in Assam has shown that wood and bamboo structures properly seasoned, with thatched roof and mud floors make excellent village schools. It has been found that for a really good and stable building of this type the cost is as low as Re. 1 per square foot. Such buildings, like other forms of light construction, must be maintained in a constant state of good repair; the floors require a weekly "leap" of mud and cowdung to keep free from dust, and the thatch has to be renewed every fourth year. For this nearly half of the old thatch can be used over again and as labour and materials are available locally at a very cheap rate the whole cost of maintenance is extremely small.

A similar cheap but efficient form of construction is also being used in the Central Provinces and Berar. The Committee were shown a model of this type of construction and were satisfied that this was a suitable type for rural schools.

In the United Provinces light forms of construction have also been used and have been found to give satisfactory results. In many parts of Madras schools are housed in a combination of *pucca* and temporary construction. The *pucca* building usually accommodates the library, office, science laboratory, store rooms, etc., whereas sheds are used for general class rooms.

While the Committee do not wish to prescribe any one form of light or temporary construction as superior to another, they are of opinion that both the need for economy and the desirability of making school buildings as flexible as possible point to the extreme importance of investigating and experimenting with the potentialities of materials other than brick and stone. They also anticipate that increasing use may be made of the many synthetic materials like Indianite which are now being placed on the market and may be expected to become cheaper as their use increases.

15. *Sites including Playgrounds and Playing Fields.*—The considerations which should in the Committee's opinion determine the sizes of school sites are as follows:—

(i) In seletcing a site the total accommodation that is likely to be required ultimately rather than the needs of the moment should be the determining factor.

(ii) Sites for modern schools should be much larger than those previously thought adequate. Modern school design requires much more space for convenient grouping of rooms and for their proper lighting and ventilation. Apart from this the importance now attached to outdoor activities *e.g.*, gardening and the organised games and physical training calls for additional space.

(iii) The responsible authorities should do their best to anticipate the need for new schools particularly in new centres of population and buy ample sites in good time.

(iv) A school building should be kept as far as possible from the noise and dust of busy roads.

(v) Sites should be reasonably level. There should be no undesirable surroundings and care should be taken to avoid land which is damp, made up or subject to floods.

(vi) In urban areas, school sites should be conveniently accessible by road but every effort should be made to avoid an excess of road frontage.

(vii) It is important that public services, *e.g.*, sewers, water and electricity should be available.

An area of one to two acres according to the design and method of construction adopted, should suffice for the actual buildings of any school primary, middle or high, for not more than 500 pupils. Apart from the actual space required for the buildings, the site should also provide room for a playground for recreation or physical training, in the schools above the primary stage for a school garden and wherever possible for playing fields as well. The size of the playground will probably depend to a considerable extent on the size of the school and whether land in the locality is reasonably cheap and easy to obtain. It is unnecessary to prescribe any definite amount for any particular size or type of school but the following limiting factors may usefully be borne in mind. As the playground will be much used for physical training it should be roughly rectangular in shape and should have a minimum demension of 60′. The surface should be smooth, dry, as free as possible of dust and capable of being drained.

The following may be regarded as minimum areas:—

For	160	children	½ acre.
„	320	„	1 „
„	480	„	1½ acres.

At the same time the importance which the Committee attach to all school buildings being as clean and tidy as possible extends also to the playground. No school will gain anything from the possession of a playground so large that it cannot be kept in good order. While the Committee do not advocate the provision of a school garden, by which they mean an area suitable for practical instruction in horticulture, in the case of primary schools they certainly do not wish to discourage the provision on primary school sites of flower beds or even small vegetable gardens provided these can be kept in proper order. Even very young children get pleasure and profit from learning about flowers and vegetables. Gardening or agriculture as a subject will not find a place in the curriculum of many middle and high schools in urban areas but it should do so in those in rural areas and adequate space should be available for practical work. The area required will depend on the syllabus to be taken and may vary from a minimum of one up to four or five acres.

Playing fields as distinct from playgrounds are not essential at the primary stage but should be regarded as necessary adjuncts to any middle or high schools whether for boys or girls. No educational development is more to be welcomed than the encouragement now given to organise games in the better girls schools. If the time-table is properly arranged it will be found unnecessary to provide playing fields large enough for the whole school to play at the same time. While allowance must be made for the varying amounts of wear which different types of surface will stand, experience suggests that with good organisation and proper care the following areas will suffice for playing fields:—

For	160	children	2—3 acres.
,,	320	,,	4—5 ,,
,,	480	,,	6—7 ,,

Playing fields should be rectangular in shape to facilitate the economic siting of pitches, reasonably level and capable of being properly drained. Where the surface is grass, hockey and football goal areas should be frequently changed. Where they are at any considerable distance from the school itself changing and lavatory accommodation should be provided.

16. *Maintenance of School Buildings.*—The Committee are anxious to stress the fact that school buildings should always be kept in the best possible state of repair. They know of many instances where good buildings have been provided but owing to the fact that adequate provision has not been made for their maintenance, they have rapidly fallen into disrepair and apart from the adverse effect on their occupants their effective life has thus been materially shortened. The Committee strongly recommend that every educational budget should make adequate provision for the repair and upkeep of school buildings. There should be a regular rota for external and internal redecoration of schools, the period being determined by the nature of the construction and local climatic conditions. Temporary buildings, particularly when of wood, require frequent painting both inside and out and this is one of their obvious drawbacks. Another and probably the most important factor in maintaining school premises in the best possible order is the establishment of an efficient caretaking and cleaning service.

Particular attention has been paid to this in western countries and school caretaking cannot but be regarded as in effect a skilled trade. The Committee wish to endorse certain remarks by the Board of Education, England, in this connection which will be found below:—

"Schools should be planned so as to enable them to be well kept, with the minimum of trouble and expense. Atttention to such details as the rounding off of all corners and the tiling of window sills, so as to facilitate the removal of dust, will produce buildings which are not only easier and cheaper to keep clean than the older schools, but also furnish an object lesson to the children in the importance of a bright and clean environment. Ample accommodation should be provided for the caretaker. His function has usually been under-estimated in a school. It can, and should in fact, assume a great importance in the social training imparted by the school; dirty and ill-kept premises are a poor example for the teachers in their attempts to train the pupils in clean, tidy and healthy social habits. Apart from the paramount need for scrupulous cleanliness in the lavatories and offices, authorities and managers will be well advised to ensure that the floors, walls and windows of schools are kept clean. For this purpose it will be helpful to have at least one slop sink and water tap for the use of the caretaker, and where there is a considerable distance to walk from one end of the school to the other it may even be desirable to have such a sink attached to each set of lavatories. These sinks will be of considerable value also for such purposes as the cleaning of inkpots and the changing of water for flowers in the classrooms, both of which tasks are often performed in the ordinary wash basins with unfortunate results.

Provision should also be made for cupboards for the caretaker's necessities. Where the caretaker is employed full-time, but does not reside on the school premises, sanitary accommodation should be provided for him.

A covered space for dust-bins is necessary, so contrived that they are concealed from view."

The cleanliness of the school surroundings is not less important than that of the actual buildings and in both these respects the pupils should be trained to lighten the work of the caretaking staff. Bins for litter should be placed conveniently and failure to use them should be regarded as a matter for discipline. Finally Headteachers and Inspectors should be left in no doubt that the general cleanliness of the school buildings and grounds will be regarded as a very important factor in assessing its efficiency.

17. The Committee recognise, as they have stated earlier in this report that the great majority of the buildings at present used for school purposes in this country will not comply even with the minimum conditions prescribed in this report. They feel strongly that immediately circumstances permit—and they trust this will be in the near future—active measures will be taken to replace unsatisfactory buildings. Over and above this they assume that the time is not far distant when the need for providing education for the vast numbers of children not at present attending school will also receive recognition. To do this will mean in every part of India a building programme of vast dimensions. If this is to be made possible financially, a departure from the present system by which non-recurring expenditure is included in the annual budget becomes inevitable. The Committee understand that in Great Britain the financing of school construction out of revenue except where the amount involved is comparatively small is strongly discouraged by Government. Sites are purchased, schools built and furniture purchased out of loans spread over periods varying between 15 years in the case of temporary buildings, 30 to 40 in the case of permanent ones and 60 in the case of sites. By this means it is possible to embark on a heavy building programme without placing an intolerable burden on the budgets of one or two years. The Committee strongly recommend that all expenditure on

school sites, buildings and equipment exceeding Rs. 5,000 for any one item should be met from loan.

18. *General conclusions.*—The Committee realise that in the ordinary way it is convenient to summarise the conclusions and recommendations of a report. They feel, however, that the enquiry upon which they have been engaged covers so wide a field and necessarily involves so many matters of detail that any summary to be comprehensive would have to be intolerably long. Moreover, as they have tried to indicate from time to time, their object has not been to prescribe one particular type of building as pre-eminently suitable for each grade of school. They have endeavoured to lay down with sufficient precision certain conditions which must be observed in any building before it can be regarded to fit for use as a school but subject to the observance of these they feel that in a country as large as India where climatic conditions, local customs, available materials, resources and other factors determining construction vary so greatly the best service they can render is to supply the authorities responsible for building and maintaining schools with a number of suggestions to guide them in the planning of their buildings and a variety of actual plans among which they may make their choice. The main recommendation which the Committee wish to make is that if this report is approved generally by the Central Advisory Board, the material it contains, supplemented by plans and estimates which in many cases are already available, should be reproduced in book form. The Committee believe that a book on the design and construction of school buildings, revised from time to time in the light of up-to-date research and experiment, would be of real value and is precisely the form of practical assistance which the Board is in a position to render to Provincial Governments, Local Administrations, Indian States and all other bodies responsible for building and maintaining schools.

Sd. JOHN SARGENT. (*Chairman.*)
,, W. H. F. ARMSTRONG.
,, S. M. AZAM.
,, J. M. BOTTOMLEY.
,, A. W. H. DEAN.
,, A. GOPALA MENON.
,, G. G. R. HUNTER.
,, JYOTINDRA MARKAND MEHTA.
,, J. LEITCH WILSON.
,, E. G. MCALPINE.
,, M. A. MIRZA.
,, S. N. MOOS.
,, J. C. POWELL-PRICE.
,, D. S. REDDY.
,, S. C. ROY.
,, K. G. SAIYIDAIN.
,, SURENDRA NATH KAR.
,, W. W. WOOD.

ANNEXURE I.

AGENDA FOR THE SCHOOL BUILDINGS COMMITTEE OF THE CENTRAL ADVISORY BOARD OF EDUCATION.

> (*N.B.*—A summary of the information available as to the standards adopted or rules prescribed by Provincial Governments and States in connection with school buildings will be found in Annexure II.)

1. To consider whether the Committee should confine their attention to buildings for schools up to the end of the high school stage or whether it is desirable and practicable to extend the investigation to cover educational institutions beyond that stage.

> (*N.B.*—The agenda has been prepared on the assumption that the Committee will not desire to deal in detail with educational buildings beyond the high school stage. The planning of Technical and Art Institutions, University Colleges and Universities and even of Training Colleges and Normal Schools will be determined by the particular nature of the work which they are called upon to undertake and as this will vary from institution to institution to a greater or less degree, the prescribing of any schedules of accommodation etc., that would be generally applicable would appear to be an impossible task. It may, however, be feasible to lay down certain principles which may be observed in the design and planning of buildings for institutions of these types. This question has been put down for discussion under item 13 of the Agenda.)

2. To determine the superficial and cubic space required for each pupil in an ordinary class room at the primary stage, and in an ordinary class room, science laboratory and room for practical instruction (a) at the middle stage and (b) beyond the middle stage.

3. To consider the maximum number of (a) boys (b) girls for whom accommodation should be provided in an ordinary class room at the primary stage, and in an ordinary class room, science laboratory and room for practical instruction (a) at the middle stage and (b) beyond the middle stage.

4. To fix with due regard to educational efficiency and the need for economy a schedule of accommodation for—

- (a) Primary Schools—
  - (1) with 2 classes;
  - (2) with 5 classes;
  - (3) with more than 5 class sections.
- (b) Middle Schools (not forming part of high schools):—
  - (1) with 3 classes;
  - (2) with 6 class sections;
  - (3) with 9 class sections.
- (c) High Schools (with middle sections):—
  - (1) with 5 classes;
  - (2) with 10 class sections;
  - (3) with 15 class sections.

(A High School which includes classes XI and XII will require separate consideration).

(*N.B.*—A class section means a sub-division of a class large enough to require a separate teacher.)

5. To fix sizes and dimensions of rooms in:—

(a) Primary Schools:—
- (1) ordinary class rooms;
- (2) rooms for kindergarten, infants or nursery classes;
- (3) halls (if any);
- (4) rooms for practical instruction (if any);
- (5) teachers' rooms;
- (6) store-rooms.

(b) Middle Schools (not forming part of high schools):—
- (1) class rooms;
- (2) practical rooms:—
  - (i) wood or metal work;
  - (ii) spinning and weaving;
  - (iii) domestic science;
  - (iv) other crafts.
- (3) elementary science laboratories;
- (4) halls (if any);
- (5) library and reading rooms;
- (6) teachers' rooms;
- (7) store-rooms.

(The size and dimensions of the area required for school gardening and agricultural instruction will be considered under 'Sites').

(c) High Schools (with middle departments):—
- (1) class rooms;
- (2) practical rooms:—
  - (i) wood or metal work;
  - (ii) arts and crafts;
  - (iii) domestic science;
  - (iv) geography.
- (3) Laboratories:—
  - (i) junior;
  - (ii) senior,
  - (4) halls;
- (5) gymnasia;
- (6) libraries and reading rooms;
- (7) dining rooms;
- (8) teachers' rooms;
- (9) store-rooms.

6. To consider the special requirements of Technical High Schools or Junior Technical Schools not accommodated in Senior Technical Institutions.

7. To consider whether any special accommodation is needed in the case of schools for physically or mentally defective children.

8. To consider what additional accommodation should be provided in any school which is likely to be used for adult education purposes.

9. To consider the possibility of adopting adequate standards in connection with:—

- (a) lighting;
- (b) heating;
- (c) ventilation;
- (d) sanitation,

and to prescribe the requisite standards in each case.

10. To consider the nature and amount of the accommodation required for hostels for 25, 50 and 100 boarders.

11. To consider the main issues arising in connection with furniture and equipments for:—

- (a) ordinary class rooms in:—
  - (i) Primary schools;
  - (ii) Middle schools;
  - (iii) High schools;
- (b) kindergarten rooms;
- (c) practical rooms:—
  - (i) wood and metal work;
  - (ii) spinning and weaving;
  - (iii) arts and crafts;
  - (iv) domestic science;
  - (v) geography,
- (d) laboratories;
- (e) halls;
- (f) gymnasia;
- (g) libraries and reading rooms;
- (h) dining rooms;
- (i) hostels.

12. To consider the general principles which should determine the arrangement of school buildings of different types with a view to securing the maximum efficiency from the point of view of school organisation.

13. To consider what general principles, if any, can be usefully laid down in connection with the design and planning of institutions beyond the high school stages.

14. To consider in the light of local climatic conditions the possibility of adopting various forms of temporary or semi-permanent construction as an alternative to pucca buildings.

15. To consider the minimum areas required for sites and play grounds for different types and sizes of schools in (a) urban and (b) rural areas.

16. To prepare rough sketch plans and estimates for school buildings of various types.

17. To consider what steps should be taken to maintain in the best possible condition school sites, buildings, furniture and equipment.

18. To consider the financial problems arising in connection with the carrying out of a substantial building programme.

19. Any other business.

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ANNEXURE II.

Item 2 of the Agenda.

Province.	Minimum floor space required for a pupil in a class-room in			Minimum height of a class-room in (from floor to underside of beam).		Remarks.
	Primary Schools.	Middle and High Schools.	Technical Schools and Training Colleges.	Primary Schools.	Middle and High Schools.	
	Sq. ft.	Sq. ft.	Sq. ft.	Ft.	Ft.	
Madras .	9½	11	15	10 to 12	12* to 14	With the availability of funds, floor space in excess of the minimum should be provided. Rooms intended to be used for practical work, etc., should be considered each on its own merits.
Bombay .	10 to 12	12 to 15	15 to 20	†12 to 14	†12 to 14	Ditto.
Bengal .	10 to 15	10 to 15	Not available.	12 to 14	†12 to 14	No single school-room should be more than 600 Sq. ft. nor designed for more than 40 children.
Punjab .	9	12	do.	(*a*)	(*a*)	
Baluchistan .	9	12	do.	(*a*)	(*a*)	
Travancore .	8	8	do.	(*a*)	(*a*)	

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* The same for technical schools and training colleges.

† When the total floor space exceeds 600 sq. ft., the height must be at least 14 ft. (if the area exceeds 360 sq. ft., the height not to be less than 13 ft.).

(*a*) Information not available.

Item 3 of the Agenda.

Province.	Maximum number of pupils in a class-room for whom accommodation should be provided.	Remarks.
Bengal	50	No room for less than 24 children, and no infants' room for more than 30 infants.
Punjab	45	
Baluchistan	40 in Middle and High and 30 in primary class-room.	
Travancore	Not less than 50 pupils.	The maximum number of pupils to be accommodated in any laboratory, workshop, etc., to be determined by the Inspecting staff.

Item 5 of the Agenda.

Province.	Type of room.	Dimensions of a room in a Primary School.			Estimated cost.	Remarks.
		Length ft.	Breadth ft.	Height ft.	Rs.	
	School for 150 children.					
Madras	(*a*) Store room	14	7	9	...	No school or class-room should be more than 24 feet in width. In the case of a school divided into a number of class rooms, the dimensions of any room should not exceed 24-ft. × 25-ft. The smallest class room for 40 boys with dual desks should be 21-ft. wide and 23-ft. long.
	(*b*) Class I (2 rooms)	24	14	9	...	
	(*c*) Class II (1 room)	20	14	9	...	
	(*d*) Class III and Classes IV and V (1 room for both).	17	14	9	...	
	School for 100 children.					
	(*a*) Store	6	12	9	...	
	(*b*) Class I (2 rooms) 26 children in each.	20	12	9	...	
	(*c*) Class II (20 children).	16	12	9	...	
	(*d*) Classes III and IV (28 children).	20	12	9	...	

*Information collected from standard plans.

Item 5 of the Agenda—*contd.*

Province.	Type of room.	Dimensions of a room in a Primary School. Length ft.	Breadth ft.	Height ft.	Estimated cost. Rs.	Remarks.
	School for 50 children.					
	(a) Store . .	6	12	9	...	
	(b) Class I (25 children).	20	12	9	...	
	(c) Classes II and III.	16	12	9	...	
Bombay .	Class room for 30 children.	16	16	10	...	1. The same as in Madras. 2. The size and dimensions of all the rooms to be the same.
Bengal . .	Class room for 27 children.	18	15	12	...	The sizes of class rooms to be kept within the following dimensions : L. B. H. Min. 18' 15' 12' Max. 26' 24' 14'
	Class room for 30 children.	26	22	13	...	No single class room to contain more than 600 sq. ft. of floor space.
Punjab . .	Four-roomed school	15	15	9	...	Each room to be of uniform size.
Bihar . .	Lower Primary (2 roomed) school.	23	12	12½	...	Verandah 4-ft. wide.
	Upper primary (3 roomed) school.	16	15	10½	...	Without verandah.
Orissa . .	Two roomed primary school for four classes.	30	15	13½	...	Verandah 5-ft. wide.
	Three roomed primary school for four classes.	(a) 20 (for 2 rooms each).	15	13½	...	Verandah 5-ft. wide.
		(b) 30 (For 3rd room).	15	13½	...	
	Three roomed primary school for six classes.	30	15	13½	...	Verandah 5-ft. wide.
	Three roomed primary school for five classes.	(a) 30 (For 2 rooms each).	15	13½	...	Do.
		(b) 20 (For 3rd room).	15	13½		
Assam . .	A single teacher school room.	30	16	Not given.	...	Verandah 6-ft. wide.
	Two teachers school room.	50	16	Do. .	...	Do.
	Three teachers school room.	75	16	Do. .	...	Do.
North-West Frontier Province.	(a) One room .	20	16	Do. .	...	Verandah 10-ft. wide.
	(b) Second room .	18'10½"	16	Do. .	...	
	(c) Masters room .	12	8'10½"	Do. .	...	

Item 5 of the Agenda—*contd.*

Province.	Type of room.	Dimensions of a room in a Primary School.			Estimated cost.	Remarks.
		Length ft.	Breadth ft.	Height ft.	Rs.	
Ajmer-Merwara.	(*a*) Store room .	8	8	12	...	
	(*b*) 2 Class rooms .	18	15	12	...	
	(*c*) Water room .	8	8	12	...	
Baluchistan .	(*a*) School at Hudda (4 roomed).	24	15	10	...	Verandah 10 ft. wide.
	(*b*) Headmaster's room.	10	15	10	...	
	(*a*) 2 roomed school at Kawas.	24	15	9½	...	Verandah 8-ft. wide.
	(*b*) Store room .	8	15	9½	...	
	A general two roomed school.	20	15	8½	...	Verandah 8-ft. wide.
	Government Primary School, Quetta.					
	Two Kindergarten rooms.	50½	20	15	...	
	8 Class rooms .	25	20	15	...	
	Headmaster's room	18	18	15	...	
	Staff room . .	18	20½	15	...	
Sind . .	One teacher school room for 30 boys.	16	16	12	Rs. 1,616 (for pucca construction).	Verandah 8-ft. wide.
	Two teachers school—two rooms—each for 30 boys.	16	16	12	Rs. 2,718 (2 teachers). Rs. 4,119 (3 teachers).	Verandah 8-ft. wide and 32-ft. long.
	(3, 4, 5 and 6 roomed school).	16	16	12	Rs. 5,137 (4 teachers). Rs. 6,164 (5 teachers). Rs. 7,151 (6 teachers).	
Baroda . .	*Standard design for cheap village schools.*					
	1, 2 and 3 roomed school (each room for 40 boys).	20	16	10	Rs. 1,800 (1 roomed). Rs. 3,600. *Rs. 2,060 (2 roomed). Rs. 5,400. *Rs. 2,950 (3 roomed).	Verandah 6-ft. wide.
	4 units school					
	(*a*) Two outer rooms (each for 40 boys.)	16	22	10	Rs. 8,000. *Rs. 4,650 (4 roomed).	Verandah 6-ft. wide.
	(*b*) Two other rooms	20	16	10	Rs. 9,500 *Rs. 5,750 (5 roomed).	(5, 6, 7 and 8 units schools having same dimensions).
	(*c*) Store room and Water room.	16	6	10	Rs. 11,000 (6 roomed). Rs. 12,500 (7 roomed). Rs. 14,000 (8 roomed).	

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*Without passage.

Item 5 of the Agenda—*contd.*

Province.	Type of room.	Dimensions of a room in a Primary School.			Estimated cost.	Remarks.
		Length ft.	Breadth ft.	Height ft.	Rs.	
Mysore	*A design.*					
	(a) Two rooms	12	15	12	...	
	(b) Third room	24	12½	12	...	
	D Design.					
	(a) 1 Class room	12	10	Not given.	...	
	(b) Open air class	16	12	Do.	...	
	(c) Headmaster's room.	12	10	Do.	...	
Travancore	*Primary school for 200 pupils.*					
	6 rooms (separated by wooden partitions).	20	18	8	...	
Kashmere	*Basic School.*					
	(Type plan No. 1.)					
	3 roomed school	20	16	14	Rs. 1,881 (without verandah). Rs. 2,051 (with verandah).	Verandah 8-ft. wide.
	(Type plan No. 2.)					
	(a) Four rooms	20	16	14	Rs. 3,260 (without verandah).	Do.
	(b) One corner room	24	16	14	Rs. 3,559 (with verandah).	
	(Type plan No. 3.)					
	(a) Six rooms	20	16	14	Rs. 4,064 (without verandah).	Verandah 8-ft. wide.
	(b) One corner room	24	16	14	Rs. 4,740 (with verandah).	
	(Type plan No. 4.)					
	(a) Six rooms.	20	16	14	Rs. 5,995 (without verandah).	Verandah 8-ft. wide.
	(b) One corner room	24	16	14	Rs. 6,595 (with verandah).	
	(c) Craft room	30	16	14	...	
	(d) Teacher's room	18	16	14	...	
	(e) Office room	16	16	14	...	

Item 5 of the Agenda—*contd.*

Province.	Type of room.	Dimensions of a room in a High School.			Estimated cost.	Remarks.
		Length ft.	Breadth ft.	Height ft.	Rs.	
Bengal . .	(*a*) 8 rooms—each for about 30 pupils.	26	22	Not given.	...	
	(*b*) Teachers' room .	22	16	Do. .	...	
	(*c*) Library and Office.	22	16	Do. .	...	
	(*d*) Central Hall .	52	26	Do. .	...	
	(*e*) Ante room and cloak room.	52	16	Do. .	...	
Punjab . .	*Government High School.* (Single section.)					
	(*a*) 4 Class rooms .	23	22	16	...	Verandah 8-ft. wide.
	(*b*) 2 Class rooms .	22	23	16	...	
	(*c*) Drawing room .	25	25	16	...	
	(*d*) Sanskrit room and Arabic room.	22	12	16	...	
	(*e*) Science and Laboratory.	25	45	16	...	
	(*f*) Headmaster's room.	10½	14	16	...	
	(*g*) Office . .	10½	14	16	...	
Bihar . .	(*a*) 10 rooms . .	20	20	13	...	Verandah 6-ft. wide.
	(*b*) 2 rooms . .	25	20	13	...	
	(*c*) Library . .	15	20	13	...	
	(*d*) Office . .	15	20	13	...	
	(*e*) Hall . .	20	40	Not given.	...	
Assam . .	(*a*) 9 rooms . .	24	17	Do. .	...	(1) Covered verandah 10-ft. wide.
	(*b*) Science room .	32	24	Do. .	...	(2) Another verandah 7-ft. wide.
	(*c*) Geography and Drawing room.	32	24	Do. .	...	
	(*d*) Manual work room.	32	24	Do. .	...	
	(*e*) Boys' Common room.	32	24	Do. .	...	
	(*f*) Library . .	24	17'	Do. .	...	
	(*g*) Office room .	16	17	Not given.	...	
	(*h*) Headmaster's room.	8	17	Do. .	...	
	(*i*) Teacher's room .	24	17	Do. .	...	
North-West Frontier Province.	(*a*) 8 Class rooms .	23	22½	18	...	Veranda 8-ft. wide.
	(*b*) Drawing room .	31	25	18	...	
	(*c*) Sanskrit room .	17	22½	18	...	
	(*d*) Arabic room .	17	22½	18	...	
	(*e*) 2 Class rooms .	23	24½	18	...	

Item 5 of the Agenda—*concld.*

Province.	Type of room.	Dimensions of a room in a High School.			Estimated cost.	Remarks.
		Length ft.	Breadth ft.	Height ft.	Rs.	
	(*f*) 3 Class rooms .	22½	23	18	...	
	(*g*) Science Practical room.	25	31	18	...	
	(*h*) Science Lecture room.	27	22½	18	...	
	(*i*) Staff room .	15	15	18	...	
	(*j*) Headmaster's room.	15	15	18	...	
	(*k*) Record room .	21	7½	18	...	
Baluchistan .	(*a*) 3 rooms . .	22	23	Not given.	...	
	(*b*) 6 rooms . .	23	22	Do. .	...	
	(*c*) Kindergarten room.	25	40	Do. .	...	
	(*d*) Language room	22	23	Do. .	...	
	(*e*) Staff room .	22	20	Do. .	...	
	(*f*) Science room .	22	37	Do. .	...	
	(*g*) Drawing room .	25	25	Do. .	...	
	(*h*) Record room .	12	22	Do. .	...	
	(*i*) Headmaster's room.	12	16	Do. .	...	

Item 9 of the Agenda.

(a) *Lighting.*

Madras.—For admission of light and air, there should be windows. (a) They should be placed at regular intervals so as to ensure uniformity of light. (The edge of the last window in the north wall should be behind the last row of pupils.)

(b) Window sills should not be more than 4 ft. from the ground in rooms in which the scholars are seated at desks. When pupils sit on the floor the sills should come to within 2½′ or 3′ of the floor level. Windows for subsidiary lighting may have their sills more than 4′ from the floor.

(c) The window area should not be less than one-fifth of the floor area and wherever possible the principal lighting should be from the north.

Bombay.—(a), (b), (c) as in Madras.

(d) The light from north windows should not be masked by sun bonnets or by verandahs except in localities where the sun glare is very great.

(e) The windows on the south aspect are subsidiary and are chiefly for ventilation.

(f) Sky-lights properly so called should never be placed in class rooms. Where, owing to difficulties of situation, some form of top lighting is unavoidable, the best form is that commonly adopted in factories and machine shops with the light coming in from the north.

Bengal.—Windows serve two purposes—(a) admission of light, (b) admission of air. No window should be provided merely for external architectural effect. Every part and corner of the school should be well lighted, and the sky should be visible from every seat in a class-room. To fulfil this requirement, the angle of aperture should not be less than five degrees of an arc in any part of the room.

Unilateral lighting of class-rooms should be adopted, the light being admitted from the left side of the pupils. Where left light is impossible, right light may be allowed. Direct front light is not allowable in any case. The whole window area should not be less than one-fifth of the floor space, but in very confined sites one-fourth may be required. The main effective light, but not less than one-half of the prescribed window area, should be admitted from windows with a north aspect. Windows on the south aspect, if provided, should be merely subsidiary and chiefly for ventilation.

Except in localities where the sun glare is very great, the light from the north windows should not be masked by any sun bonnet or hood, shade or verandah.

The windows on the north may be placed at regular distances so as to ensure uniformity of light. They should be placed as far to the rear of the class-room as possible. The edge (glassline) of the last window (the window furthest to the teacher) in the north wall should be behind the last row of pupils.

The wall at the teacher's end should be left blank or blind (windowless) for a length of nine feet, as this space is kept between the teacher and the front of pupils.

The mullions or piers between the windows should be as narrow as safety of construction will permit, as thick heavy mullions not only obstruct a great amount of light, but they also use up a great deal of the effective wall space. To add strength and reduce width, iron mullions with heavy flanges or webs should be used. The window frames may be directly bolted to such mullions, the outer portions of which may be made wedge-shaped, running nearly to a sharp edge.

The window sills should be placed not more than four feet and not less than three feet and a half above the floor of rooms in which the pupils are seated at desks. For rooms in which the pupils sit on the floor, the sills should come to within three or two and a half feet.

The window heads should reach as near the ceiling as possible, which need not be more than ten to twelve inches. The tops of the glass surface of the windows should not be less than twelve feet above the floor. Unless the tops of the windows be more than fourteen feet above the floor, the plan should show no space more than 24 feet from the window wall in any class-room.

All window spaces should be fitted with hinged and glazed windows. All wood-work around the window and between the glass panes should be bevelled. The panes of windows may be either of clear (not frosted or ground) or ribbed (prismatic) glass, but the glass panes should not be broken up too much.

Skylights properly so called should not be placed in school-rooms or class-rooms. They may be allowed in central halls having ridge or apex ventilation.

Bihar has issued instructions similar to Madras.

Artificial lighting.

Bengal.—If the prescribed rules are followed to provide the admission of the requisite amount of day light, artificial light should not be needed for day schools in India. But in evening and night schools, as well as in school buildings used for educational purposes after school hours, artificial illumination should be provided. Direct diffused lighting should be the rule. Indirect light, such as light reflected from the ceiling and coloured surfaces, should be avoided.

A proper system of school-room illumination should be installed to meet the following requirements:—

(a) The light should be produced with as little contamination of the air as possible.
(b) The heat production should be low.
(c) The light should not be rich in the rays of the spectrum which are irritating to the eye.
(d) The light should be steady and the lamps should not be subject to rapid deterioration.
(e) The light should be well diffused so as to secure uniform illumination throughout the room.
(f) The light should be properly shaded so as to prevent points of great brilliancy from coming within the field of vision and to avoid annoying and disturbing shadows from falling on the work.
(g) The amount of light necessary varies according to the purpose for which it is required. More is needed for fine work than for the ordinary class exercises. The illumination of the work on the desk should be somewhat superior to that of the surrounding objects, but it should not be greatly in excess. The proper location of the lighting fixtures is of the greatest importance.
(h) The cost of installation and maintenance should be moderate.
(i) The fixtures should be of durable construction and easy to clean and repair.

Electric incandescent gas, or acetylene gas light is to be preferred in the order stated, and should be used with diffusing prismatic reflectors. The spacing of lights may be at intervals of six feet. measured from the first light, placed a little to the left of the first seat.

(b) *Heating.*

Bengal.—Provision should be made for the warming during the winter of schools located in cold or hilly places. 30 feet of heating surface should be allowed for every thousand cubic feet of air space. A low pressure hot water system in conjunction with open fires will be most advantageous The fire-place should be located at the teacher's end of the room in the corner remote from the door, in order to keep space for the teacher's desk and blackboard. Radiations should be placed under the windows. A thermostat should be fixed in every class-room heated by an indirect method.

(c) *Ventilation.*

Madras, Bombay, Bengal.—Unless there are windows reaching to the top of the wall and capable of being opened, ventilators are necessary near the top of the wall on both the north and south aspects. The ventilators should be regularly distributed in the same way as the windows. For each pupil 48 square inches of open ventilator should be provided. Gratings in floors should not be allowed. Such a provision will not, however, be necessary when the walls are short and the space above their height is enclosed by bamboo or other lattice work.

(d) *Sanitation.*

Bengal.—In sewered towns where it is practicable to install water-closets no such closet may be located within the school building, but at a short distance, and be completely disconnected from the latter. The distance should not be less than twenty feet.

The septic tank system may be adopted in country schools.

Service privies may be provided only when sweepers are available; whose work can be supervised by a member of the school staff. Such privies should not be placed nearer than forty feet to any school building. They should be so situated that the prevailing wind will not blow from them in the direction of the school.

Separate privies and approaches should be provided for boys and girls, and the same passages or corridors may not be used by both the sexes. Separate provision for teachers and pupils should also be made.

No privy shall be located within a distance of fifty feet from any source of water supply.

The number of closets for boys, girls and infants may be provided on the following scale:—

	Number of pupils.	Boys.	Girls.	Infants.	Girls and Infants.
Under . .	30	1	2	2	2
,, . .	50	2	3	3	3
,, . .	70	2	4	4	4
,, . .	100	3	5	5	5
,, . .	150	3	6	6	6
,, . .	200	4	8	8	7
,, . .	300	5	12	12	8
,, .	500	8	20	20	12

सत्यमेव जयते

For boys, urinal stalls at the rate of 4 per cent, occupying 10 running feet of urinal space should be provided in addition to closets.

Urinals should be of impermeable material for their floors, sides and backs—patent stone, glazed tiles, good quality of slate, hard seamless marble, artificial stone ware or white glass slabs or plates shall be admissible for the purpose.

No closet should be less than two feet and a half, and not more than three feet, in width in the clear with a minimum depth of four feet. More room may be allowed to teachers and children. Only one set may be allowed in each closet.

A double row of privies or urinals placed back to back should be disallowed.

Every privy or urinal should be so constructed as to be flooded with sunlight during some part of each clear day, and under any condition should be thoroughly lighted and ventilated.

The privy floor should be made of some impervious material, with an even surface capable of resisting disintegration and of being properly washed down. It should be sloped inwards.

The facings of the privy walls should be of a smooth, non-absorbant substance, and should extend to not less than three feet above the seats or squatting plates. Light glazed bricks or white glazed tiles form suitable wall surfaces, as they prevent the absorption of light and render it easy to scrub and disinfect them. Unglazed bricks cannot be allowed to be used for privies, as they are absorbant and may become highly offensive. Iron sheeting either flat or corrugated, may be allowed if properly attended to.

Every closet should be provided with a ¾th door short of both bottom and top—not less than three inches at the bottom and not less than 6 inches at the top. The tops of the back walls should have recantgular ventilators.

As a screen for privies, a fenestrated brick wall or a sheet of corrugated iron may be used.

All water-closets and urinals should be provided with proper service cisterns, which, together with the outlet therefrom, should be capable of giving a sufficient flush.

Item 10 of the Agenda.

Hostels and Dormitories.

Bengal.—In the case of single rooms or cubicles the minimum floor space to be provided should be 96 square feet. Each such room or cubicle should be independently ventilated or lighted.

Rooms for the accommodation of not less than three, but not more than four, occupants should provide 65 square feet of floor space a head, and those for five or more pupils a minimum of 60 square feet a head. Sleeping-rooms, each measuring 16¼′ × 16′ and intended for the accommodation of four inmates, are recommended as convenient and economical in design.

The minimum floor area to be provided in dormitories should not be less than 60 square feet a head.

The scale of privy accommodation should be double of that prescribed for day schools (under item 9). Urinals may be in the same proportion as for day schools.

सत्यमेव जयते

Item 10 of the Agenda—*contd.*

Province.	Type of room.	Dimensions of a room in a Boarding House			Estimated cost.	Remarks.
		Length ft.	Breadth ft.	Height ft.	Rs.	
	Boarding House for 100 boys.					
Punjab . .	(a) 4 Dormitories each for 16 boys.	45	18	15	58,500	Verandah 8-ft. wide.
	(b) 2 Dormitories each for 18 boys.	50	18	15	...	
	(c) 1 Reading room	18	20	15	...	
	(d) 2nd Reading room.	19	19	15	...	
	(e) Sports' Godown.	18	10½	15	...	
	(f) Bathing place .	19'10½"	19½	11	...	
	(g) Space for lavatories.	29'1½"	7½	...	...	
	(h) Office . .	12	18	15	...	
	(i) Superintendent's sitting room.	16	12	15	...	
	(j) Superintendent's living room.	12	12	15	...	
	(k) Bath room and Kitchen for Supdt. (each).	7	7	11	...	
	(l) 3 Dining rooms	20	12	12	...	
	(m) 3 Kitchen rooms	15	16	12	...	
	(n) 3 Store rooms .	8	8	10	...	
	(o) 3 Fuel rooms .	8	7½	10	...	
	(p) 3 Water rooms .	6	6	10	...	
	(q) 3 Washing platforms.	8	5	...	...	
	(r) 2 rooms for cooks	12	8	10	...	
	(s) 4 Servants rooms	12	10	10	...	Verandah 6-ft. wide.
	(t) 2 rooms for sweepers.	12	10	10	...	Do.
	Boarding House for 50 boys.					
	(a) 2 Dormitories for 16 boys.	18	45	15	Rs. 36,100 .	Verandah 8-ft. wide.
	(b) 1 Dormitory for 18 boys.	50	18	15	...	Do.
	(c) 1 Reading room	19	19	15	...	Verandah 6-ft. wide.
	(d) Bathing place .	19½	9'7½"	11	...	Do.
	(e) Space for Lavatories.	10'10½"	7 (approx.)	...	...	Do.
	(f) Office . .	12	18	15	...	
	(g) Superintendent's sitting room.	16	12	15	...	Verandah 7-ft. wide.

Item 10 of the Agenda—*contd.*

Province.	Type of room.	Dimensions of a room in a Boarding House.			Estimated cost.	Remarks.
		Length ft.	Breadth ft.	Height ft.	Rs.	
	(h) Superintendent's living room.	12	12	15	...	
	(i) Superintendent's Bath room.	7	7	11	...	
	(j) Superintendent's kitchen.	7	10	11	...	
	(k) 2 Dining rooms	20	12	12	...	
	(l) 2 Kitchen rooms	15	16	12	...	
	(m) 2 Store rooms .	8	8	10	...	
	(n) 2 Fuel Godown	8	7½	10	...	
	(o) 2 Water rooms .	6	6	10	...	
	(p) 2 Cooks' quarters.	8	12	10	...	
	(q) 2 Servants' rooms.	12	10	10	...	Verandah 6-ft. wide.
	(r) 1 Sweeper quarter.	12	10	10	...	Do.

ANNEXURE III.

Note on Pisé *system prepared by Mr. Sheikh Ahmad, Lahore.*

The art of building is one of the three fundamental needs of society for it provides shelter from the elements. Although in many schools students are taught to satisfy two of the three dominant needs, that is food and clothing, it is a pity that not enough emphasis is given to the art of living, with the consequence that the people of India are quite unaware of the fact that nice homes, beautiful school buildings and healthy surroundings will affect the future health and happiness of their children. It is generally recognised that the first impression created upon the mind of a child and his environments, are the two factors which influence his outlook on life. It is for this reason that equipment and building of schools along with well trained and efficient teachers are receiving more attention all over the world. In a place like India which has been for centuries the home of the finest of crafts and of industries, the present deficiency of new ideas and designs in the industrial produce of the country, can be ascribed to the lack of proper home and school environment which have gradually cramped the growth of artistic and aesthetic appreciation of the people.

In London a test was carried out to prove the authenticity of the idea that bad surroundings have a bad effect upon the mind of a child. It showed that the children bred in the slums were dull in matters of art, for their background and environment made no appeal to their aesthetic sensibility. It is for this reason I feel that along with reading, writing and arithmetic, the new generation of India and especially of her villages should be given instruction to build simple, cheap, appropriate and charming houses which will satisfy the growing needs of the educated class of people. Otherwise the dissatisfaction of being in ugly surroundings will drive them out of their homes and they will not be of any service or value for the future development of the countryside.

To carry out this work to a successful issue we should commence with the building of schools, for it is here that the new generation will spend most of its time. The experience of beautifully designed, well ventilated, tastefully decorated, cool, or easily heated, school buildings will automatically affect the home life of the people in general and their industries in particular. Where new school buildings are not necessary, the students can carry out repairs in the existing buildings in accordance with the scheme. The teachers and the students may be trained to look after the repair of the buildings and apart from saving a considerable amount of money for the Department of Education, they will learn a most useful craft. Some of them may later take up the study of architecture seriously and become architects and town planners, and continue to work as a good architect in harmony with the natural beauty of each locality throughout India.

Using local labour and materials.—The following school building project may appear difficult on paper but in reality it is very practical and comparatively quite simple, because of the following facts:—

1. In building schools or houses, the local materials such as wood, stone or bricks and earth are employed to their best advantage. Earth is a material which is identified with the neighbourhood and when used properly will not only be cheap but very durable, growing in strength day by day. The defect in the present method of building with mud or other types of earth, carried out in some parts of India, is that it has neither the durability nor the beauty of *Pisé* work. This is because of the inherent faulty system in choice, treatment of earth and construction. This includes the foundation, actual building of the walls and their waterproof coating and plastering.

2. The equipment needed for *Pisé* work is not only very small but very inexpensive. Hardly a dozen tools are needed for ramming the earth and a few types of shuttering and a few shapes of moulds for making *Pisé* blocks.

3. In the beginning average students and teachers under the guidance of a mistri or two, can build beautiful and airy school buildings in a very short time when the design is supplied by the Department of Education under whose expert advice the entire work will be carried out. After a short training the teacher himself can take over charge of the construction. For the durability of *Pisé* building, it is essential that it should have a pucca foundation which can be constructed either from the local stone or bricks. In contrast to an entire brick building, *Pisé* building needs only a nine inch foundation which obviously saves time, labour and expense.

4. Similarly the construction of *Pisé* walls is a very quick process and it is possible to build a structure in about one-third of the usual time.

5. The strength of *Pisé* structure depends upon the choice of the earth and the special method of ramming, whereby all the air is driven from the material and the whole building becomes a homogeneous unit which strengthens as the years go by. I remember in America seeing a farmer trying to break an old *Pisé* wall for which he was using a pick-axe as one would for a cement building.
6. Another beauty of *Pisé* building is that it is comparatively cool in summer and warm in winter. The upkeep of these buildings is negligible. The usual colour of the building is light ochre but it is also possible to give it any other colour along with the waterproof coating.
7. It is desirable to evolve new and suitable designs for the various climates of the country. In cold climes the arrangement of the class rooms should be such that four rooms should be heated at once with one fire place which means a saving in the building and heating expense as well as leaving more space for the classes. For the warm climates cross ventilation, wide verandahs and the use of longer windows instead of too many doors is very essential.

The furniture of the future school buildings should be in harmony with the simplicity of the building. The designer should take into consideration the fact that it should be beautiful, useful and comfortable, for it is only when utility is combined with beauty that perfection is reached.

ANNEXURE IV.

Note on primary school buildings in Rural Areas by the Director of Public Instruction, Central Provinces and Berar.

The various types of buildings have all the common defect that they admit insufficient light, while most of them are insufficiently ventilated. This is largely due to the obsession prevalent both among school authorities and among the villagers themselves that a school building should approximate to a village house, quite forgetting that the village house is not used for reading or writing but only for cooking and sleeping and therefore does not require the same degree of lighting. It is also due to the familiarity of the school authorities with the old standard pattern of a four-walled brick building. In every type of building, then, whether the roof has rested on the walls or not, walls have always been built, right up to the roof either of solid mud, in cases where the walls were built to support the roof, or thin Sindhi walls of bamboo coated in mud and plaster, where the walls were intended merely for lateral protection against the wind and rain. But in every case the effect was the same. The day light was completely blotted out, except to the extent that it might enter through the diminutive windows high up in the wall, or through the single door, usually kept closed. The reasons usually given for building these Sindhi walls right up to the roof are two:—one for protection against rain and the other for protection against thieves. Neither are valid. Lateral protection against rain, except on the wind-ward side, would be afforded equally well by half-walls stopping short of the height of the exterior edge of the eaves: the intervening space between the half-wall and the roof could either be open or filled with bamboo lattice work. As regards protection against thieves, it is well-known that school masters place no credence in the power of the flimsy Sindhi walls to keep off thieves who, in any case, could make their entry through the thatched or tiled roof with the greatest of ease. And so, as a matter of fact, village Headmasters never leave anything of value in the school premises, but usually make a habit of removing daily the school registers and the Time-Piece. (I have heard of only one case of theft from the village school, *viz.*, the Time-Piece, and this only in a single instance).

2. It must, however, be admitted that the need for protection against rain is a very real need, and no Sindhi wall or even solid mud-wall will stand up to a monsoon if not given lateral as well as vertical protection from the rain. A solid brick wall requires, of course, only vertical protection: but few villages know how to make burnt bricks; and the cost of importing bricks is prohibitive. Lateral protection to mud and Sindhi walls is sought to be given in many cases by placing Tattis made of grass against the wall. This is to a certain extent effective, but tends even further to diminish the scanty allotment of day-light, and in the monsoon the class rooms become darker than ever. There is no doubt that the staggering statistics of defective eye sight in high schools and colleges revealed by Medical Inspection is mainly, if not entirely, due to reading and writing in deficient day-light in our primary schools.

3. It is clear, therefore, that a new type of school must be designed for rural areas and a design, which it is believed will meet all requirements, is submitted herewith. The following points should be noticed:—

(i) Instead of the usual marquee-tent-shaped roof, a shed-shape has been substituted. This will permit of indefinite extension as fresh class rooms are required.

(ii) The school is to be orientated in such manner that the shorter side of the oblong faces the prevailing monsoon wind.

(iii) On this side a wall of weather-boards is designed reaching from the ground right up to the apex of the roof, thus affording complete lateral protection from rain.

(iv) No brick is employed at all in the building, the plinth consisting of mud overlaid with cow-dung.

(v) The roof projects 3 ft. on the wind-ward side, thus screening the weather-board wall from roof drippings: it also projects 3 ft. on the lateral side sufficiently to cover the verandahs and afford protection from the wet to the mud half-walls that enclose the class rooms on the lateral sides.

(vi) The bamboo lattice work which reaches from the mud half-wall to the roof supplies adequate ventilation and lighting for the class room, and at the same time permits of the lowering of rolled matting in the event of excessive wind, dust or glare. Naturally the matting will only be let down on one side at a time, which will ensure adequate ventilation and lighting from the opposite side.

(vii) The interior accommodation, 16 x 24 ft., is designed to suit a single class of 40 pupils, allowing 8 sq. ft. per pupil and a further frontage of 4 x 16 ft. for the master and the black board. In the event of small enrolment, which is inevitable in rural circumstances where it not infrequently happens that the male population of school-going age of the centre and the feeder villages combined does not exceed 40, it will be possible to hold 2, 3 or even 4 classes in this single room without undue congestion; and according to the demands of classes or the distribution of light at different times of the day, classes can be held facing in any of the four directions. As the school expands with the growing popularity of education and, it is to be hoped, the gradually increasing attendance of girl pupils, the class room space can be easily extended by prolonging the roof in the direction away from the wind-ward side and prolonging the lateral half-walls to the same extent.

(viii) Since adequate light and ventilation are provided by the lattice work it is not necessary to provide them through the class room entrance, which has therefore been confined in the plan to a single entrance on one of the lateral sides only at the end of the class room farthest from the wind-ward side.

(ix) All the materials employed in the construction, with the exception of the weather-boards are such as are available to the villagers free of cost, or can be so made available by the Malguzar or the Forest Department; and the labour required for their utilization in the erection of school buildings is such as the villagers themselves can supply. Even nails (except for fixing the weather-boards) are not necessary, as jointures can be effected by the simple method of creeper lashings, as the villagers use in the construction of their own dwellings.

(x) As regards the weather-boards, at present in many villages of the Central Provinces and Berar there is no carpenter. The only implement the villager uses in dressing his wood is the axe. Consequently it is not to be expected that the villagers will be able to fashion their own weather-boards. Here again, nails would be required to fasten the weather-boards to the *ballis* (vertical wooden posts) and these the villagers will not be able to supply. It will therefore be incumbent on the school authority or the Government to supply the weather-boards and the requisite nails. It should not be unduly optimistic to hope that the Forest Department will supply the necessary weather-boards and that the school authority will supply the necessary nails, until such time as the introduction of Manual Training into the Primary School Curriculum will secure in each village an adequate knowledge of the use of the carpenter's plane, the saw and the hammer.

(xi) It is estimated that the cost of erecting a sigle class room, 16 x 24 ft. on the plan submitted will not exceed Rs. 18 (the cost to the Forest Department and the school authority for weather-boards and nails) assuming that the other materials are provided by the villagers, that the Forest Department or the Malguzar makes no charge for the cutting of the timber and bamboos necessary, and that the villagers, as they have already done in many instances, volunteer their labour. However, even if this is not the case and the school is erected by a contractor it is estimated that the total cost should not exceed Rs. 162.

4. In cities and municipalities where the population is relatively constant and the demand for primary schools permanent, we may continue to build solid buildings of brick or stone. But in rural areas the population is far more fluctuating; villages become deserted, schools have to be closed and re-opened at new centres: and this is an additional reason for urging the adoption of primary school buildings of the type set forth in the plan (placed on the table). Such a building, with annual repairs to its roof and annual renewals of its cow-dung floor covering and annual plastering of its half-mud walls, should last for at least 30 years, which is looking sufficiently far ahead in the case of village schools. And if at the end of that time the village still remains and the school-going population is sufficient to justify a continuance of the school, it can be rebuilt for the same infinitesimal cost.

5. The building of such schools is of course without prejudice to the desirability of holding classes in the open under the shade of a big tree when weather conditions are favourable.

ANNEXURE V.

Furniture and Equipment.

Rooms for Nursery and Infants Classes.—Expensive and elaborate equipment is not necessary. Simple well-designed toys will do much to stimulate a child's imagination and some educationists consider that scientifically designed play-material covering the progressive stages from 2 to 7 is essential. Where this is provided, special storage will be required.

The following articles may be found useful in equipping a Kindergarten room:—Swing, Climbing Rope, Rings, Slide, Balancing Board. Blackboards should either extend continuously along three sides of the room or should be in frames 4 to 6 feet long, fixed low on the wall so that children can draw on them easily. As furniture in these rooms should be easily movable, nesting tables and chairs are recommended. Chairs should be so designed as to ensure good posture: a number of different sizes should be available.

Science laboratories.—There should be three suspension beams running the full length of the laboratory for demonstration purposes. These should be 3 inches wide, 9 inches deep below the ceiling and firm enough to support the head of a ladder. Ordinary plaster walls are not suitable for laboratories. Walls should be surfaced with some form of internal facing bricks or with plastic paint over a skim coat of plaster. For the lower 4½ ft. of the wall, wherever possible, erosion-proof panels should be provided. Ceilings should be painted to avoid absorption of moisture and gases.

Up to and including the normal High School stage there is no need for heavy or elaborate furniture. A Demonstration bench about 8 ft. by 2 ft. to 2½ ft., provided with a flap at one end to increase its length to 10 ft. and with a sink at the other end is recommended. Drawers and cupboards should be fitted on the teacher's side and the teacher's platform should be raised by 6 inches. A blackboard approximately 12 ft. by 4 ft. should be fixed to the wall behind the teacher's desk. Where a lantern or epidiascope is used, it should be projected from one end of the teacher's bench and part of the opposite wall should be left free and suitably treated for use as a screen.

The old type of bench is no longer regarded as necessary: ordinary firm tables with drawers and seasoned teak tops are quite adequate. Whether these should be double, *i.e.*, broad enough for pupils to work on two sides or single is a question which will have to be settled in relation to the dimensions of the laboratory and the maximum number likely to use it at any time. The usual dimension of double benches are 5 ft. long, 3½ ft. wide, 2¾ ft. high. A wood and metal work bench should be provided for the repair of equipment. Two sinks, in addition to the one in the demonstration bench should also be provided. Gas and electric points at intervals are a great asset. Fume cupboards are only necessary when advanced work is done.

Practical Rooms—Middle and High Schools.—Practical instruction is being increasingly recognised as a desirable feature of the curriculums even in schools without any effective industrial bias. Schools of the modern type usually provide practical rooms or sheds where wood work, metal work, spinning, weaving, lino-cutting, needle-work, leather work and other crafts may be taught. Large schools may be able to afford a separate practical room for each craft, but in small schools each room will almost certainly be used for several purposes and must be equipped and furnished accordingly. Ample storage preferably in the form of a separate room is essential for every practical room and the dimensions of the store-room should be determined by the nature of the material to be stored, *e.g.*, wood stores should be long enough to take the lengths of timber normally used. Store-rooms should also be easily accessible from the practical rooms. Cupboards, if provided in the practical room itself, should not be allowed to project too far from the walls or to encroach unduly on floor space.

If a water supply exists, one or two sinks should be provided in every practical room. Electric or gas points are also most useful but it is realised that in a great many cases the necessary supplies will not be available. One long fixed bench which may be combined with built-in cupboards should be placed under the main windows.

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(a) *Wood work.*—The most convenient size for a wood work bench for 2 boys is about 5 feet by 2 ft. 6 inches. There should be clearance between benches of 3 ft. to 3 ft. 6 inches in each direction. In determining the height of benches regard should be had to the size of boy likely to use them; 27" for boys between 11 and 14, and 30" for boys over 14, may be taken as rough guides, except in those areas where the average stature varies considerably from the normal.. An additional bench along one side of the room will also be useful. The floor of the wood work room should be non-resonant and of a material which will not blunt tools if they are dropped on it. There should be plenty of blank wall-space and sufficient wall blackboards. A small first aid cup board is desirable.

(b) *Metal Work.*—Equipment for light metal work may be provided at a moderate cost. Most of the work can be done with vices and benches round the room or down the centre but a solid floor must be provided for forges, muffles etc. Additional equipment in the shape of lathes or drilling and grinding machines will be needed for the senior classes in Technical High Schools. An adequate course in Wood and Metal Work can be provided in Middle and High Schools without the use of any power-driven machinery.

(c) *Spinning and Weaving.*—No special furnishing is required for spinning. For weaving, the furnishing will vary according to the size and pattern of the looms. The type of loom in which the leg space is dug out of the floor, is most suitable for the drier parts of the country. In placing the looms roughly the same clearances will be needed as in the case of wood work benches.

(d) *Art rooms.*—The walls and ceilings should be treated, in light, neutral tints in order not to confuse colour judgment. Free wall space is valuable for hanging children's work and exhibiting collections of drawings and paintings.

Furnishing may be of two main types, either in Western or in the traditional Indian style. Furniture in either case, should be light and easily movable, so that grouping may be varied as required. In the Indian style, the child sits on the floor on a piece of matting or board and works at a desk with a flat top. An alternative arrangement is to furnish the Art room with chairs with sloping backs and light trestles. Tables with adjustable tops are, however, sometimes preferred, particularly where light crafts are done in the Art room. The following equipment is also recommended:—

1. One long bench with teak top under the high windows of one wall.
2. Cupboards under the bench for uncompleted work.
3. Two sinks not less than 2 ft. by 1 ft. 6 inches.
4. A small blackboard for demonstration.
5. Shelves for display of models and pinrails for drawings.

There should be a store, not less than 90 sq. ft. in area, preferably with a window at one end and fitted with a large sink and draining board and shelves of varying heights. In addition, there should be built-in cupboards along one wall preferably fitted with sliding doors.

(e) *Domestic Science—Cookery and Laundry.*—Floors should be of a material which allows them to be kept scrupulously clean with the minimum labour. Many suitable types of patent flooring material are on the market. Walls should be lined with tiles or with mosaic to a height of 2 ft. above the sinks, cookers and work tables, so that splashes can be readily cleaned off. The cooking and laundry equipment provided should be similar to that which the girls will be likely to use in their own houses. In places where water, gas and electric supplies are already or are likely to become available in the near future, there is much to be said for teaching the use of gas and electric stoves, irons, etc. In such cases the placing of the points needs careful consideration. Other equipment should be the sinks with draining boards, 3 ft. by 1 ft. by 10 inches, one floor sink in another part of the room and a refrigerator, wherever possible.

For laundry work in addition to an adequate provision of sinks,—there should be at least two ironing tables with flaps. Other tables of a movable type, at least 5 ft. 6 inches by 2 ft. 6 inches, with working spaces on either side may be provided. They should be fitted with drawers to take utensils. Stools of the nesting type are to be preferred. A blackboard of 6 ft. by 3 ft. in two parts hinged to form cupboard doors should also be provided.

Science Store and Dark Room.—Ample storage should be provided behind the teacher's demonstration bench. Cupboards 1 ft. deep should be planned under the blackboard with a cupboard at least 2 ft. 6 inches deep at one side, for storing bells, jars, bottles, etc. The store room, should run the full width of the Science room and should be directly accessible from it. One end may be partitioned off as a dark room so that the store room can still be available when the dark room is in use. These rooms should not have windows but should be carefully ventilated. Adequate shelves for materials and equipment must be provided and there should be a sink with hot and cold water in the dark room. In schools where Botany and Biology are taken, facilities for studying plant and animal life should be available. A greenhouse or Wardian cases for growing botanical specimens are essential and arrangements for housing live animals are desirable.

ANNEXURE VI.

Furniture and Equipment.

Halls.—Nesting chairs or wood folding chairs of varying sizes should be provided, so that the floor can be easily cleared for such purposes as physical training, rhythmical exercises etc. The provision of a stage with a prosenium is recommended. Storage can be conveniently arranged under the stage. Sectional or removable platforms are not recommended. The sections are not easy to store when not in use and such platforms are much less useful for dramatics.

Gymnasia.—The gymnasium floor is of great importance in view of the wear it receives. An open grained timber is to be preferred, soft woods tend to splinter and hardwoods become slippery. The placing both of fixed and movable equipment must be carefully considered in the planning and construction of a gymnasium. The main apparatus will consist of wall bars, beams, climbing ropes, and window ladders. This apparatus should be obtained from and fixed by a specialist. The strengthening of the walls and ceiling both to support apparatus and to resist the effect of constant vibration is of course a matter for the architect.

Libraries.—Book shelves should be at right angles to the longer walls and there should be a window to each of the alcoves so formed. Metal shelves are to be preferred to wooden ones but where metal is not available some hard wood impervious to weather and insects should be used. Two important considerations in planning a library are that the books should be as accessible as possible and that the lighting, natural or artificial, should be adequate.

Dining rooms.—The desirability of arranging for pupils to take a meal or meals at school has been generally accepted. Where a cooked meal is provided, the dining room and the kitchen will have to be on a more elaborate scale than where milk and light meals only are served from a buffet. The equipment of the kitchen will depend on the nature of the meals to be provided and local requirements.

The floor of the dining hall should be capable of being easily washed and cleaned. Wooden chairs with rubber tips to avoid noise may be provided for children to sit and if tables are provided, the top may be of teak or of 'patent stone' or marble slabs wherever such materials are cheap. Where cooked meals in Indian style are served, table tops of patent stone or some metal are preferable as they are not susceptible to staining and are easily cleaned. Separate tables for not more than 10 children each should be provided. Suitable cupboard space should be provided for storing plates, cups and glasses.

Hostels.—With regard to the articles of furniture in the hostels, the following suggestions are made:—

> Beds should be constructed in such a way (either of metal or wood) as to afford little scope for harbouring bugs and other vermin. For each bed there should be one small bed-side table, one chair, a mirror fixed to the wall at a suitable height, a shelf for books and a deep cupboard built into the wall or an almirah.

The reading room and the common room may be furnished in the same way as they are in the ordinary day schools. Kitchen and dining rooms may also be similarly furnished.

ANNEXURE VII.

SCHOOL PLANNING.

(The following suggestions are extracted from "The Design of Nursery and Elementary Schools, Architectural Press, London, S. W. 1, 1988.")

Classrooms.—There are many opposing ideas about the planning and disposition of classrooms. At present ideas are in an experimental stage and many experiments are still on paper.

In describing the possible disposition of classrooms, arguments are given for and against each type, based on information collected from recently built schools. As a general principle, classrooms should be grouped together as a separate unit of the plan: assembly hall, library, classrooms, science rooms, practical rooms, domestic science rooms, workshop—these are distinct departments and should be planned so that they can be appreciated as such. And for all types there are two warning signals: firstly, the ultimate objective is not merely to provide the maximum sunlight and air, but to give every child the maximum opportunity for health and interest in his work. Secondly, in the enthusiasm for "freer planning" it must be remembered that the most free plan is not necessarily the most attenuated, but rather the one which functions most easily and pleasantly, having coherence in all its parts.

A. Courtyard.

The grouping of classrooms round a courtyard became a habit as a result of confined sites allotted to schools in built-up areas. Though entirely unnecessary on generous sites, the habit still persists. Financial stringency is usually the first cause of this type.

Advantages.—Compactness of circulation. Economy.

Disadvantages.—Impossible for all classrooms (and practical rooms) to be given good orientation. Over-shadowing of rooms facing courtyard, particularly if building has two or more storeys. Cumbersome effect, shut-in feeling, Difficulties of adequate sound separation. Inflexibility.

B. Single Series.

This is becoming the most common type for schools built on adequate sites. It is most successful when planned as a single floor with not more than eight class-rooms. With more than eight classrooms the continuous corridor becomes tedious. When there is only one floor, supplementary lighting and cross ventilation can be provided by forming a continuous range of windows above the corridor roof level but when there are two or more storeys supplementary lighting to lower floors can only be provided by means of windows on both sides of the corridor, cross-ventilation by means of ducts below floors of upper corridors. Walls between classrooms can be made sufficiently sound proof by planning cupboards part of the way up the wall and using insulation board as lining for the remainder. Most sound leakage is likely to be through open windows. A glass sound-baffle, projecting about four feet between windows of classrooms, will deflect a considerable amount of sound, and windows themselves, if made to open in the right direction, provide a certain amount of deflection. Low shrubs also help to absorb sound and at the same time form visual shields for outdoor teaching spaces.

Advantages.—Simplicity, easy circulation, economical construction.

Disadvantages.—Difficulties of overcoming sound leakage. Only one full window-wall.

C. Separated Single Series.

This type is only suitable for single-storey buildings. It provides outdoor teaching spaces between classrooms. A variation is to have two classrooms sharing one outdoor teaching space.

D. Double Series.

Planning with central corridors is noticeable in some recent "model" schemes. It is only possible in single-storey buildings, the corridor roof being kept low in order to get light and ventilation in the upper parts of inner walls. Domestic service rooms, art and needle-work rooms are usually given the less sunny aspect. Corridors can be lighted and ventilated by the familiar dome method.

Advantages: Reduced length of corridor. Reduced cost of construction. Variety of outlook.

Disadvantages.—Increased width of corridor (to cope with greater congestion). Sense of confinement in corridor (in spite of increased width). Wrong orientation for some classrooms.

E. Separated Double Series.

This type covers the same length as type B, while providing the intermediate outdoor teaching spaces of type C. It works best when classrooms are orientated with window-walls facing east and west.

Advantages.—Sound separation. Sheltered and shielded outdoor teaching spaces. Adequate lighting and ventilation. Variety of outlook.

Disadvantages.—Reduced sunlight in half of classrooms. Occasional west sun in teachers' eyes. Expensive.

Parallel Series.

An arrangement which has been successfully used in several American Schools. It is particularly suitable where a large number of classrooms have to be planned on one floor. If the spaces between each series are wide enough, an attractively planted playlawn can be provided for every four or five classrooms. It is reasonable to make the main corridor a covered way, or, if attached to a covered play space, screened by windows on one side only.

Advantages.—Easy and pleasant circulation. Opportunity for planning covered way, cloakrooms and lavatories along side main corridor without taking away light and outlook. Good orientation and variety of outlook for all classrooms. Avoidance of monotony. Double window wall in end classrooms. Easy to add additional classrooms.

Disadvantages.—Difficulties of overcoming sound leakage. Only one full window wall in most classrooms. Additional lengths of corridor. Expensive.

G. Elbow Access, Square.

Its object is to get two parallel window-walls in each classroom. The planning becomes more feasible if minor corridors are widened out and used as locker rooms for each pair of classrooms.

Advantages.—Adequate light and ventilation on both sides of classrooms, whether planned on one or two floors. Extension of class outdoors in either direction. Classes undisturbed by circulation in corridor.

Disadvantages.—Sound leakage through windows likely to be exaggerated in small courts, particularly if two storeys high. Small courts difficult to keep attractive. Disturbance of main circulation by constant elbow bends. Extra lengths of corridor. Additional expense, including cleaning and upkeep.

H. Elbow Access, Diagonal.

Not so suitable for two-storey planning as type G. Another variation of this type is to have classrooms in the same formation but directly connected with main corridor the triangular space forming a bay for lockers. This cuts out the second window-wall but eases circulation considerably.

Advantages.—Same as type G *plus* good insulation between class rooms and between outdoor teaching spaces.

Disadvantages.—Even smaller courts than in type G, awkward in shape and difficult to keep attractive. Breaking up of main circulation. extra lengths of corridor, additional expenses.

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